



AIR/WATER CHILLERS AND HEAT PUMPS WITH AXIAL FANS

CONTROLLER MANUAL



Models

HWA1-A / HWA1-H 0140

HWA1-A / HWA1-H 0147

HWA1-A / HWA1-H 0260

HWA1-A / HWA1-H 0272

HWA1-A / HWA1-H 0285

INDICE

1	CONSERVATION OF THE MANUAL	3
1.1	GRAPHIC SYMBOLS USED IN THE MANUAL	3
2	PERMITTED USES	3
3	GENERAL SAFETY GUIDELINES	3
3.1	PERSONAL PROTECTION EQUIPMENT	3
3.2	HEALTH AND SAFETY OF WORKERS	3
4	PURPOSES AND CONTENTS OF THE MANUAL	4
5	USER – ONBOARD CONTROLLER INTERFACE	5
5.1	LED	5
5.2	MENU’S STRUCTURE DIAGRAM	6
5.3	MENU	6
5.3.1	<i>Setpoint menu</i>	6
5.3.2	<i>Password menu</i>	6
5.3.3	<i>Sensors menu</i>	6
5.3.4	<i>Alarms menu</i>	7
5.3.5	<i>Digital inputs menu</i>	7
5.3.6	<i>Parameters menu</i>	7
5.3.7	<i>Operation’s hours menu</i>	7
5.3.8	<i>USB menu</i>	7
5.4	USER ADJUSTABLE SET-POINTS	8
6	MANAGEMENT OF COMPRESSORS	8
6.1	COOLING MODE	8
6.2	HEATING MODE	8
6.3	DOMESTIC HOT WATER MODE	9
6.4	SAFE TIME PERIODS	9
6.5	DEACTIVATION OF COMPRESSORS FOR OUTDOOR TEMPERATURE	9
7	DYNAMIC SET-POINT CONTROL	9
7.1	SET-POINT ADJUSTMENT FROM 0-10V INPUT	9
7.2	CALCULATION OF THE CORRECTION WITH 0-10V INPUT	10
7.3	CALCULATION OF THE CORRECTION WITH RATIOMETRIC INPUT	10
7.3.1	<i>Settings for standard climatic curves</i>	10
8	CIRCULATOR MANAGEMENT	11
8.1	AIR PURGING OF THE SYSTEM	11
8.2	OPERATION BY MEAN OF THE THERMOREGULATOR (DEFAULT)	11
8.3	OPERATION UNDER THERMOREGULATOR CALL WITH PERIODIC ACTIVATION	12
8.4	HYDRAULIC PUMP IN ANTI-FREEZING OPERATION	12
8.5	CONTINUOUS OPERATION	12
8.6	LINEAR REGULATION OF THE CIRCULATOR – DOUBLE ΔT_{WATER}	12
8.7	MANAGEMENT OF DOUBLE CIRCULATOR	13
9	FAN MOTOR CONTROL	13
9.1	AC FAN MOTOR	13
9.2	STAR-DELTA (Y- Δ) FAN MOTOR	13
9.3	EC FAN MOTOR CONTROL	13
10	DEFROSTING CYCLE MANAGEMENT	14
10.1	FORCED MANUAL DEFROST	14
11	ANTIFREEZE PROTECTION ELECTRIC HEATERS (IF THE KA ACCESSORY IS PRESENT)	14
12	REMOTE ON/OFF CONTROL	15
13	SIGNALIZATIONS FOR HWA1-A MODELS	15
13.1	MACHINE LOCKOUT SIGNALIZATION	15
14	OTHER CONTROL FUNCTIONS WITH THE PLANT MANAGEMENT GI-MODULE (OPTIONAL)	15

14.1	FREE-COOLING	15
14.1.1	<i>Ventilation in freecooling</i>	16
14.2	ENABLEMENT OF DOMESTIC HOT WATER PRODUCTION (DHW).....	16
14.2.1	<i>MEMORIZATION OF THE SENSOR IN HEATING MODE</i>	17
14.2.2	<i>SANITARY MODE CALL FROM DIGITAL INPUT</i>	17
14.2.3	<i>REGULATOR IN COOLING</i>	17
14.2.4	<i>REGULATOR IN HEATING</i>	17
14.2.5	<i>SANITARY VALVE REGULATOR</i>	17
14.2.6	<i>HEATING MODE ON DOMESTIC HOT WATER TANK</i>	18
14.3	SUMMER/WINTER MODE ROMOTE COMMUTATION.....	18
14.4	PLANT REMOTE CONTROL (MANAGEMENT).....	18
14.5	DOUBLE SET-POINT MANAGEMENT.....	18
14.5.1	<i>SETTINGS</i>	18
14.5.2	<i>ADJUSTABLE SETPOINTS</i>	19
14.5.3	<i>COMMUTATIONS</i>	19
14.6	MANAGEMENT OF A SECONDARY CIRCULATOR (RELAUNCHING PUMP).....	19
14.6.1	<i>ANTIFREEZE CONTROL OF PLANT SECONDARY PUMP</i>	19
15	SIGNALIZATIONS' MANAGEMENT	19
16	HANDBOOK FOR SOME CONFIGURATIONS OF INSTALLATION.....	20
17	TABLES OF ALLOWED CONFIGURATIONS FOR THE USER AND INSTALLER	20
17.1	SETPOINT CONFIGURATION PARAMETERS	20
17.2	CONFIGURATION PARAMETERS	20
17.3	CONFIGURATION PARAMETERS OF THE ALARMS	20
17.4	SETTING PARAMETERS	21
17.5	CONDENSATION PARAMETERS	21
17.6	COMPRESSOR PARAMETERS' CONFIGURATION	21
18	USER AND INSTALLER ALLOWED CONFIGURATION TABLES	21
18.1	SET-POINT'S CONFIGURATION PARAMETERS	22
18.2	CONFIGURATION PARAMETERS.....	22
18.3	ALARM CONFIGURATION PARAMETERS	22
18.4	SETTING PARAMETERS.....	22
18.5	CONDENSATION PARAMETERS	22
18.6	CIRCULATOR PUMP CONFIGURATION PARAMETERS.....	23
18.7	DEFROSTING PARAMETERS.....	23
18.8	COMPRESSOR CONFIGURATION PARAMETERS	23
18.9	CONFIGURATION PARAMETERS OF "GI" MODULE – PLANT MANAGEMENT – (OPTIONAL).....	23
19	ALARMS MANAGEMENT	23
19.1	E000 – REMOTE ON/OFF	23
19.2	E001 – HIGH PRESSURE	23
19.3	E002 – LOW PRESSURE	24
19.4	E003 – COMPRESSOR (C1) THERMAL PROTECTION.....	24
19.5	E013 – COMPRESSOR (C2) THERMAL PROTECTION.....	24
19.6	E004 – FAN MOTOR THERMAL PROTECTION.....	24
19.7	E005 – ANTIFREEZE ALARM	24
19.8	E006 – FLOW SWITCH ALARM	24
19.9	E009 – HIGH DISCHARGE TEMPERATURE	24
19.10	E016 USAGE PUMP 1 THERMAL PROTECTION.....	24
19.11	E026 USAGE PUMP 2 THERMAL PROTECTION.....	24
19.12	E018 – HIGH TEMPERATURE	24
19.13	E042 – POOR HEAT EXCHANGE	24
19.14	E101 - I/O MODULE COMMUNICATION TIMEOUT	24
19.15	[E611÷E682] TEMPERATURE SENSORS' ALARM	25
19.16	POWER FAILURE.....	25
19.17	ALARMS' LIST.....	25
20	MODBUS VARIABLES.....	25





1 CONSERVATION OF THE MANUAL

The manual has to be always kept for future reference. It has to be stored in a safe place, away from dusts and moisture. It has to be available and accessible to all users who shall consult it any time they are in doubt on how to operate the equipment. The company reserves the right to modify its products and related manuals without necessarily updating previous versions of the reference material. It declines also any responsibility for possible inaccuracies in the manual if due to printing or transcription errors.

The customer shall store any updated copy of the manual or parts of it delivered by the manufacturer as an attachment to this manual.

The company is available to give any detailed information about this manual and to give information regarding the use and the maintenance of its own units.

1.1 Graphic symbols used in the manual

	<i>Indicates prohibited operations.</i>
	<i>Indicates operations that can be dangerous for people and/or disrupts the correct operation of the equipment.</i>
	<i>Hazardous electrical voltage - risk of electric shock</i>
	<i>Indicates important information that the operator has to follow in order to guarantee the correct operation of the equipment in complete safety. It indicates also general notes.</i>

2 PERMITTED USES

The company excludes any contractual and extra contractual liabilities for damages caused to persons, animals or objects, by incorrect installation, setting and maintenance, improper use of the equipment, and the partial or superficial reading of the information contained in this manual.

These units have been designed only for heating and/or cooling water. Any other use not expressly authorized by the manufacturer is considered improper and therefore not allowed.





The execution of all works must be performed by skilled and qualified personnel and competent in the existing rules in the country in which the appliance will be installed.

3 GENERAL SAFETY GUIDELINES

Before beginning to operate on the units every user has to be perfectly knowledgeable about the functions of the equipment and its controls and has to have read and understood the information listed in the user's-installer's and control manuals.

3.1 Personal protection equipment

When operating and maintaining the unit, it is required to use the following personal protective equipment.

	<i>Protective clothing: Maintenance men and operators have to wear protective clothing that complies with the basic safety requirements currently in force. In case of slippery floors, users have to wear safety shoes with non-slip soles.</i>	
	<i>Gloves: During maintenance or cleaning operation protection gloves have to be used.</i>	
		<i>Mask and goggles: Respiratory protection (mask) and eye protection (goggles) should be used during cleaning and maintenance operations.</i>

3.2 Health and safety of workers

The European Community has adopted a number of directives on workplace's health and safety, which include **89/391/CEE**, **89/686/CEE**, **2009/104/CE**, **86/188/CEE** and **77/576/CEE** directives. Every employer shall implement such provisions and ensure that the workers respect them:

It's forbidden:

- To remove and/or tamper with any safety device.*
- The use of the appliance by children or unassisted disabled persons.*
- To touch the appliance when barefoot or parts of the body are wet or damp*
- To clean the unit when the power is 'ON'.*
- To pull, remove or twist the electrical cables coming out from the unit.*
- To step with your feet on the appliance, sit down and/or place any type of object.*
- To spray or pour water directly on the unit.*
- To dispose of, abandon or leave within reach of children packaging materials (cardboard, staples, plastic bags, etc.) as they may represent an environmental and health hazards.*
- To tamper with or replace parts of the equipment without the specific consent of the manufacturer. The manufacturer shall have no responsibility whatsoever in case of unauthorized operations.*



WARNING:

Before proceeding, you should read the user's-installer manual accompanying the appliance.

All the operations described below must be carried out only by QUALIFIED PERSONNEL.

The wiring to the terminal block must be performed by qualified personnel.

Any routine and/or not-routine maintenance operation shall be carried out when the equipment has been shut down, disconnected from electric power supply.

Do not put neither your hands nor insert screwdrivers, spanners or other tools into moving parts of the equipment.

The equipment supervisor and the maintenance man have to receive suitable training for the performance of their tasks in safety.

The access to the electric panel is limited only for authorized personnel.

Operators have to know how to use personal protective devices and have to know the accident-prevention guidelines contained in national and international laws and norms.

The operator's workplace has to be kept clean, tidy and free from objects that may prevent free movements. Appropriate lighting of the work place shall be provided so as to allow the operator to carry out the required operations safely. Poor or too strong lighting can cause risks.

Ensure that the work places are always adequately ventilated and that aspirators are working, in good condition and in compliance with the requirements of the laws in force.

Not all the configurations can be simultaneously enabled and/or changed.

Other values different than those of default can ensure the proper operation of the unit, in case of doubt about the value to be set contact please our office.

The company excludes any contractual and extra contractual liabilities for damages caused to persons, animals or objects, by incorrect installation, setting and maintenance, improper use of the equipment, and the partial or superficial reading of the information contained in this guide.



The access to the electric panel is limited for authorized personnel only.

It's forbidden to carry out any work on the equipment under voltage.

To touch the equipment if you are not allowed.

If the lightning risk is high, the unit must be protected, the risk assessment must comply with the CEI EN 62305-2 regulation.

If there is a possibility that a lightning can strike the area around the appliance, shut down the unit and disconnect the system upstream switch.

Make sure to ground the unit.

Do not ground the unit with pipes or lightning rods.

A poor grounding of the unit can result in electrocution.

Warning: Electrostatic discharges can damage the electronic components, before performing any work; ground the electrostatic charge by touching objects such as water or heating pipes.

Requirements before performing electrical work on the control board:

Turn off the unit from the control panel ("OFF" displayed).

Put the switch "QF" general differential on OFF position

Wait for 15 seconds before getting access to the electric board

Check the ground connection before beginning any operation.

Be sure that you are well insulated from the ground, with dry hands and feet, or by using insulating platforms and gloves.

Check that there is no foreign material near the system.



4 PURPOSES AND CONTENTS OF THE MANUAL

This manual collects the basic information concerning the configuration of the onboard control panel of the unit.

It is addressed to the installer/user of the unit: it allows you to operate the machine efficiently, even without any previous specific knowledge of it.

Not all the described functions can be individually and/or simultaneously selected. Please contact the technical office for any information.

This manual describes the characteristics of the equipment when it was being put in marketing; therefore, it may not capture later technological improvements introduced by the company as part of its constant endeavors in order to enhance the performance, ergonomics, safety and functionality.





The company introduces also technological improvements and is not constrained to update the manuals for previous versions of appliances that could not be compatible. So make sure to use the provided manual for the installed unit.

It's recommended that, the user must follow the instructions contained in this booklet, especially those concerning the safety and routine maintenance.









5 USER – ONBOARD CONTROLLER INTERFACE



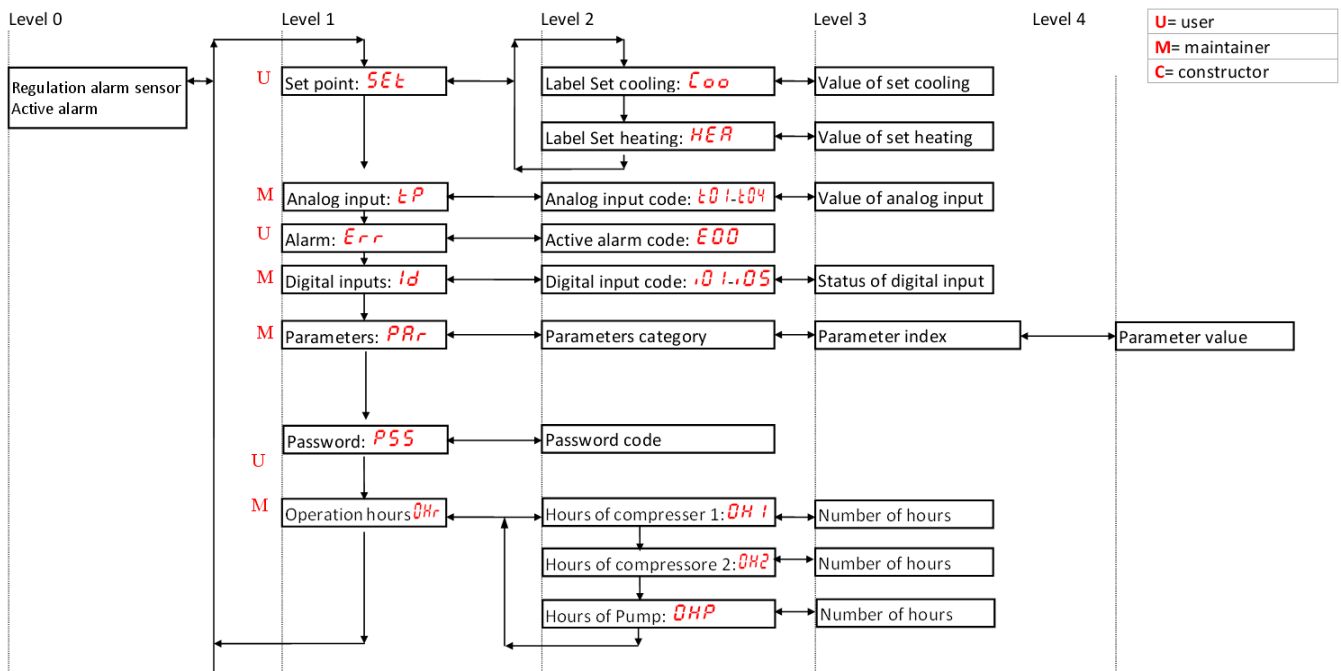
In normal visualization, the 7 segment display with 4 digits shows the regulating temperature reported in tenths of degrees or the warning code if at least one alarm is active. The type of visualization in menu mode page is depending on the position where you are. Labels and codes are used to help the user in order to identify the settings of the display.

	<p>It is used to select the operating mode, and to reset the manual resetting alarms. Each time you press the Mode button, the operating mode changes as per the sequence below: off → cool → off</p> <p>During the parameters' setting, this button can be used to revert BACK to the previous level.</p>
	<p>It allows you to enter into the setting menu parameters and to adjust the summer set point value.</p>
	<p>UP button: In the setting mode, this button allows you to move up to a higher menu or to increase the value of a parameter when you are in the "edit" mode.</p>
	<p>DOWN button: In the setting mode, this button allows you to shift to a lower menu or to decrease the value of a parameter when you are in the "edit" mode.</p>

5.1 LED

	<p>Compressor LED</p>	<ul style="list-style-type: none"> • FLASHING if timings are in progress waiting for compressor's start up. • ON if at least one compressor is running.
	<p>DHW LED</p>	<ul style="list-style-type: none"> • Flashing if sanitary mode is in operation. • ON if the selected mode is COOL + SAN or HEAT + SAN and DHW hot water production is not is active.
	<p>Defrosting LED</p>	<ul style="list-style-type: none"> • Flashing during defrost period counting. ON if defrosting is active
	<p>Antifreeze electric heater LED</p>	<ul style="list-style-type: none"> • This LED is ON if the antifreeze electric heater is in operation.
	<p>Water pump LED</p>	<ul style="list-style-type: none"> • This LED Function not available
	<p>Alarm LED</p>	<ul style="list-style-type: none"> • This LED is ON if an alarm is activated.
	<p>Heat LED</p>	<ul style="list-style-type: none"> • This LED is ON if the unit is in HEAT or HEAT + SAN mode operation.
	<p>Cool LED</p>	<ul style="list-style-type: none"> • This LED is ON if the unit is in COOL or COOL + SAN mode operation.

5.2 Menu's structure diagram



Level 0 (U) = It's always visible

Level 1 (M) = it's visible if you enter the maintainer or manufacturer password

Level 2 (C) = it's visible if you enter the manufacturer password

Level 3 (A) = it's visible only via Modbus

5.3 Menu

The main functions of the menus are listed below, especially when there are some unambiguous functions. The main menu manages the following items

MENU	LABEL	LIVEL OF PASSWORD	OTHER CONDITIONS
Setpoint	Set	User	Not accessible if the Hi-T control panel is connected
Sonde	tP	Installer	---
Alarms	Err	User	Only in case of active alarms
Digital inputs	Id	Installer	---
Parameters	Par	Installer	---
Password	PSS	User	---
Number of operating hours	oHr	Installer	---
USB	Usb	Installer	Only in the USB flash drive is present with its files

You need to access to the password menu for introducing the relative password and enable an access with a greater privilege. Once you exit completely from the menus, you lose the password privilege and need to re-enter it.

5.3.1 Setpoint menu

You can display and change the various setpoints.

SETPOINT	DESCRIPTION	UNIT	DEFAULT	RANGE
CoO	First setpoint in the summer	°C	7.0	H03 ÷ Co2
Hea	First setpoint in the winter	°C	45.0	He2 ÷ H01
*San	DHW setpoint	°C	48.0	H02 ÷ H01
Co2	Second setpoint in the summer	°C	18.0	CoO ÷ H03
He2	Second setpoint in the winter	°C	35.0	H02 ÷ Hea

5.3.2 Password menu

Enter the password for the desired access level. The controller will automatically activate the desired access level and then they will appear on this level the functions which can be enabled from this level.

5.3.3 Sensors menu

The value of the various probes is displayed. The number of visible sensor depends on the presence of the I/O expansion modules. Particular cases:

- Err = Sensor is faulty
- --- = Sensor not used (no function associated to such sensor)

By entering the maintainer password in the menu of analog inputs "tP", at the level 1 of the menu structure diagram of the on-board control panel, you can read the values of the current probes:

tp	DESCRIPTION	Unit
t01	Water inlet temperature	°C
t02	Water outlet temperature	°C
t03	Compressor intake temperature	°C
t04	Compressor discharge temperature	°C
t05	Outdoor air temperature	°C
t09	Low pressure	bar
t10	High pressure	bar
*t15	Desuperheater gas temperature sensor (if present)	°C
*t16	Recovery temperature (if present)	°C
*t17	Domestic hot water temperature (if present)	°C
*t18	Plant water plant temperature remote sensor (if present)	°C

(*) If the "Gi" optional module is installed.

5.3.4 Alarms menu

This menu appears only in case of active alarms. You can check all active alarms. The alarms are divided by circuit in case of multi-circuit units (the ALCx label allows to get access to the alarms of the circuit number x).

5.3.5 Digital inputs menu

You can check the status of the digital inputs.

0 = inactive input

1 = active input

5.3.6 Parameters menu

The parameters are collected in groups, each group is identified by a three-digit code, while the index of each parameter is preceded by a letter.

DESCRIPTION	GROUP'S IDENTIFICATIVE CODE	PARAMETER'S INDEX	VISIBILITY
Configuration	CnF	H-	USER/INSTALLER
Compressor	CP	C-	INSTALLER
Fan motor	FAn	F-	INSTALLER
Alarms	ALL	A-	INSTALLER
Regulation	Re	b-	INSTALLER
Pump	PUP	P-	INSTALLER
Electric heaters	Fro	r-	INSTALLER
Defrosting	dFr	d-	INSTALLER
Electronic valve	EEu	U-	INSTALLER
Offset	OFF	o-	INSTALLER
Inverter compressors	nCP	n-	INSTALLER


5.3.7 Operation's hours menu

You can display the number of operating hours of the compressors and of the pumps.

Press the ESC button for 3 seconds to resets the actual number of operating hours. Note that you can get access to the menu only with password.

5.3.8 USB menu

Below are indicated the functions that are available through the use USB flash drive that is connected to the board.

 WARNING	<i>All the operations with installer visibility must be carried out by qualified personnel.</i>
	<i>The company excludes any contractual and extra contractual liabilities for damages caused to persons, animals or objects, by incorrect installation, setting and maintenance, improper use of the equipment, and the partial or superficial reading of the information contained in this manual</i>

• CONTROLLER FIRMWARE UPDATING

You can upgrade the firmware using the USB flash drive via its port on the controller.

For the update:

1. Copy the update files in the main directory of a USB pen-drive;
2. Place the unit in standby mode and turn it off, placing the main switch in OFF position;
3. Introduce the USB pen-drive in its port on the controller;
4. Feed the unit by placing the main switch on the ON state;
5. Enter at the parameters PRG→PSS→ PRG →(introduce the maintainer password)→ PRG→USB→ UPdF→ PRG.

The automatic firmware update process starts with the selection of this option, the display shows the transferred data in Kilobytes. When the update is completed the display shows "boot" then the LEDs will light up in sequence.

6. .Once the update is completed, the card returns to normal operation and the appliance is ready to be enter in operation.
7. Turn off the unit by placing the main switch in OFF position.

8. Remove the USB pen-drive from its port.
9. Feed the unit by placing the main switch on the ON state.

Perform the procedure for all controllers in the unit.

• PARAMETERS UPDATING

You can upgrade the parameters using the USB pen-drive via its port on the controller.

For the update:

1. Copy the update files in the main directory of a USB pen-drive;
2. Place the unit in standby mode and turn it off, placing the main switch in OFF position;
3. Introduce the USB pen-drive in its port on the controller;
4. Feed the unit by placing the main switch in the ON state;
5. Enter at the parameters PRG→PSS→PRG→(introduce the maintainer password)→PRG→USB→UPPA→PRG.

The automatic firmware update process starts with the selection of this option, the display shows the transferred data in Kilobytes. When the update is completed the display shows "boot" then the LEDs will light up in sequence.

6. Once the update is completed, turn off the unit by placing the main switch on OFF position.
7. Remove the USB pen-drive from its port.
8. Feed the unit by placing the main switch on the ON state;

5.4 User adjustable set-points

SET-POINT	DESCRIPTION	UNIT	DEFAULT	RANGE
Coo	First setpoint in the summer	°C	7.0	H03 ÷ Co2
Hea	First setpoint in the winter	°C	45.0	He2 ÷ H01
*San	DHW setpoint	°C	48.0	H02 ÷ H01
Co2	Second setpoint in the summer	°C	18.0	Coo ÷ H03
He2	Second setpoint in the winter	°C	35.0	H02 ÷ Hea

6 MANAGEMENT OF COMPRESSORS

The compressors are managed by the controller which calculates the compressor on and off events according to the setpoint based on heat within a differential.

If several compressors are configured, the controller selects the start-up and shutdown of compressors according to operating hours. More precisely:

The ON/OFF compressor which is selected to operate will be the one (among all available compressors) with the lowest number of operating hours).

The ON/OFF compressor which is selected to shutdown will be the one (among all running compressors) with the maximum number of operating hours).

6.1 Cooling mode

- **Pa b05** = Compressor regulation delta cut-off
- **ST** = regulation temperature sensore
- **Set cool (G01)** = regulation of cooling setpoint.
- **b01** = regulator proportional band (cool)
- **b05** = compressor regulation delta cut-off
- **b25** = compressor regulation delta cut-on
- **b07** = integral time
- **HzMin** = Minimum frequency of operation derived from the algorithms of limitation
- **HzMaxReg** = Maximum working frequency of the compressor in cooling mode

The various characteristics are represented in the below table:

Number of compressors	Step 1		Step 2	
	Off	On	Off	On
1	Set – b05	Set + b25		
2	Set – b05	Set + b25	Set + b25	Set + b25 + b01
3	Set – b05	Set + b25	Set + b25	Set + b25 + (b01/2)

6.2 Heating mode

- **Set** = Setpoint in heating mode (Heat);
- **Pa b02** = Regulation band of compressors in heat pump
- **Pa b05** = Compressor regulation delta cut-off
- **H09** = Configuration of the heat pump presence parameter (0 = Heat pump not present; 1 = heat pump is present)
- **ST** = regulation temperature sensor
- **Set heat G02** = Setpoint in heating mode
- **b02** = compressors regulation band in heat pump operation
- **b05** = compressor regulation delta cut-off
- **b25** = compressor regulation delta cut-on

- **b07** = integral time
- **HzMin** = Minimum frequency of operation derived from the algorithms of limitation
- **HzMaxReg** = Maximum working frequency of the compressor in cooling mode

The various characteristics are represented in the below table:

Number of compressors	Step 1		Step 2		Step 2	
	Off	On	Off	On	Off	On
1	Set + b05	Set - b25				
2	Set + b05	Set - b25	Set - b25	Set - b25 - b01		
3	Set + b05	Set - b25	Set - b25	Set - b25 - (b01/2)	Set - b25 - (b01/2)	Set - b25 - b01

6.3 Domestic hot water mode

In sanitary mode, the maximum power is employed (like when the thermoregulator is always requiring 100% of capacity). However, the various limitations of the maximum frequency associated to the envelope and the limitation for maximum electrical absorption are active.

6.4 Safe time periods

The compressors will respect the minimum waiting time for the on or off events (regardless of the configuration and if are inverters or ON/OFF type)

C01 = Minimum Off time of a compressor.

C02 = Minimum time between two start-up of the same compressor.

C03 = Minimum delay time between a compressor switch-on and switch-on of the next one.

C04 = Minimum delay time between a compressor shutdown and shutdown of the next one.

6.5 Deactivation of compressors for outdoor temperature

If the outdoor temperature sensor is configured and is not in trouble, so the compressors cannot work because of low outdoor temperature. The function is enabled if:

- Outdoor temperature sensor integrated and operating.
- Parameter **Pa r07** = 1.

7 DYNAMIC SET-POINT CONTROL

The controller allows change the set-point by adding a value depending on the temperature of the outdoor air sensor. This function can be used if necessary by modify the parameter values, following the below information (it is the installer's responsibility to change the parameters).

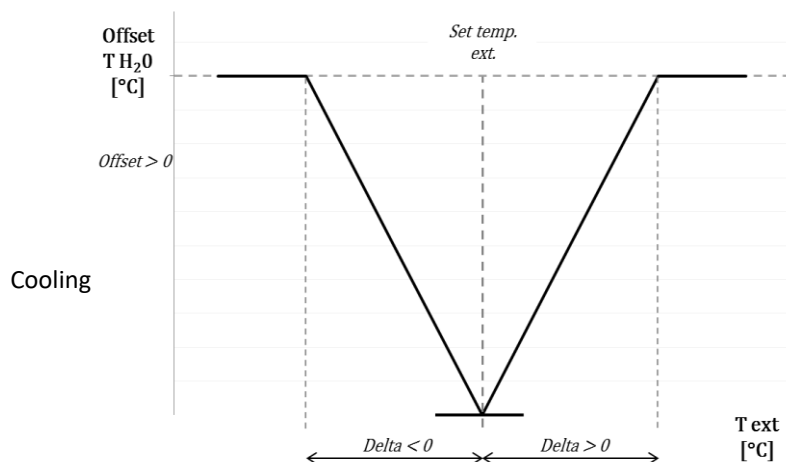
b08 active = 1/not active = 0 dynamic set-point (in the case of using of the optional "Hi-T" remote control panel for climatic compensation, b08 must be deactivated).

b09 = Maximum offset in cooling.

b11 = Set outdoor temperature in cooling.

b13 = ΔT in cooling.

Set-point modification as a function of the outdoor temperature:



7.1 Set-point adjustment from 0-10v input

If the analog input 0-10Volt/ratiometric is configured (**H12-H30 = 40**), then the value read from the sensor in matter is used to adjust the setpoint as follows:

- The entity of calibration is given by **B15**.
- Se **B20** = 0 Enablement of 0 – 10 Volt input type
- Se **B20** = 1 Enablement of ratiometric input type

7.2 Calculation of the correction with 0-10V input

- if the input is at 5 volts, the set point will be the value parameter setting.
- if the input is at 0 volts, the actual set point will be: **set point - b15/2**.
- if the input is at 10 volts, the actual set point: **set point + b15/2**.

The type of interpolation is linear

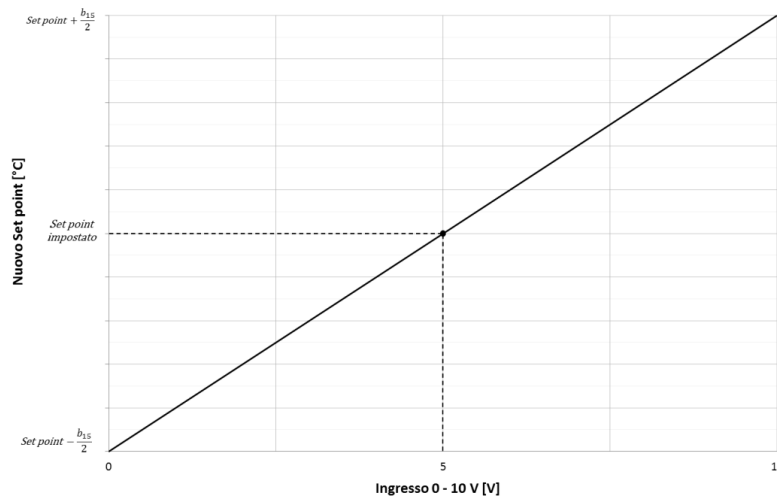
7.3 Calculation of the correction with ratiometric input

- if the input is at 50% the actual set point will be the value parameter setting (Coo/Hea) mode.
- if the input is at 0% the actual set point will be: **set point (Coo/Hea) - b15/2**.
- if the input is at 100% the actual set point will be: **set point (Coo/Hea) + b15/2**.

The type of interpolation is linear.

Another type of setting that allows to change the setpoint by adding (or subtracting) a value in function of the 0-10V analogue input (if enabled). To enable the function, you must set the **H21** parameter to be **40**, and change the values of the parameter **b15** (range 0-10), taking into account that:

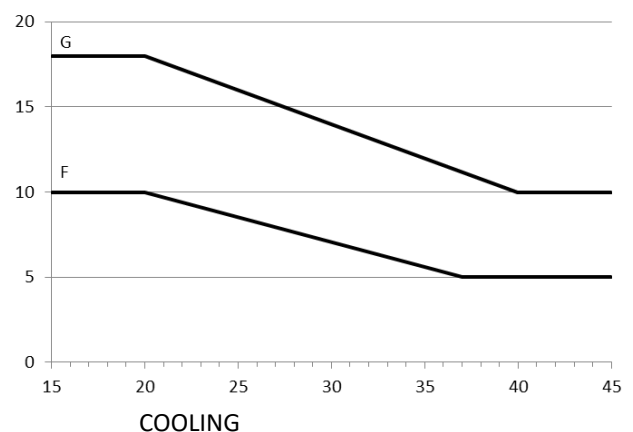
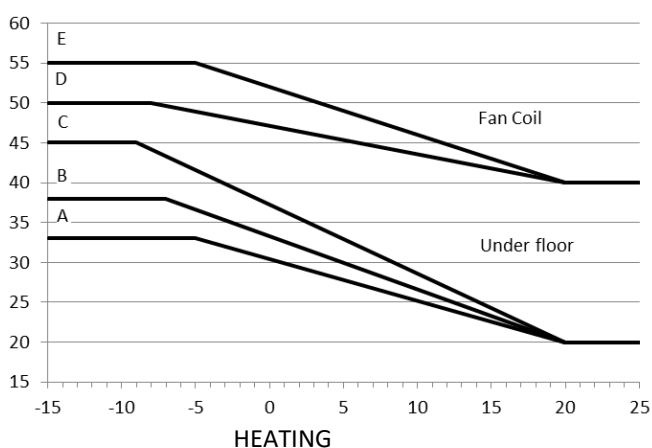
- if the input is at 0 volts, the actual set point will be: **set point (Coo) - b15/2**.
- if the input is at 5 volts, the set point will be the value parameter setting (Coo) mode.
- if the input is at 10 volts, the actual set point: **set point (Coo) + b15/2**.



The 0-10V signal must be applied to the terminals AI10+ and AI10- (see the wiring diagrams).

Note: In "cooling" mode, considering that the setpoint by default is set to be 7°C, the parameter (**b15**) should not assume any value greater than or equal to 6 in order to prevent that the new setpoint set from 0-10V input to take values below the threshold of the antifreeze operation which is 4°C.

7.3.1 Settings for standard climatic curves



	Set-point	b08	b10	b12	b14
A	20°C	1	18°C	20°C	-27°C
B	20°C	1	13°C	20°C	-25°C
C	20°C	1	25°C	20°C	-29°C
D	40°C	1	10°C	20°C	-28°C
E	40°C	1	15°C	20°C	-25°C

	Set-point	b08	b09	b11	b13
F	5°C	1	5°C	37°C	-17°C
G	10°C	1	8°C	40°C	-20°C

8 CIRCULATOR MANAGEMENT

The circulator of the pump can be set according to one of the following operation modes:

- Operation by thermo-regulator (default)
- Operation by thermo-regulator with periodic activation
- Continuous operation

The circulator will switch off immediately if:

- You have a pump (circulator) in locking alarm including the manual reset flow switch alarm.
- The unit is in stand-by mode or when it's switched off from a remote input (when it's turned ON). The circulator turns off always with a delay given by **P02**.

The circulator is always running if the antifreeze heaters are **ON**.

The circulator can be configured with the parameter **P03** in order to make it operating independently than the compressor or under a call for operation.

P03 = 0 for Continuous operation

P03 = 1 for operation under the thermoregulatory call

Note: Whenever the flow switch alarm is automatically reset the pump is ON even if the compressor is off.

Otherwise, the circulator remains always in operation if the antifreeze heaters are ON or when the hydraulic pump operates in antifreeze mode. The operation in antifreeze mode starts if the water setting temperature decreases below **P04 °C** (default value 5°C), and stops if the water setting temperature increases above **P04+P05 °C** (the default value of **P05** is **2,0°C**).

The regulation of the circulator is linear type.

8.1 Air purging of the system

This function allows the air purging of the system, to achieve this function, the circulator will run at its maximum speed.

To enable the function:

Controller in **OFF** mode

Enter at the parameters PRG→PSS→ PRG→(introduce the maintainer password)

Press simultaneously for **3 seconds** the buttons **UP and DOWN**.

The circulator of the plant will run at the maximum speed for **5 minutes** then it stops the operation.

It is possible to stop manually the air purge cycle function of the system by pressing the **MODE/ESC** button, or by pressing simultaneously the **UP** and **DOWN** buttons for 3 seconds.

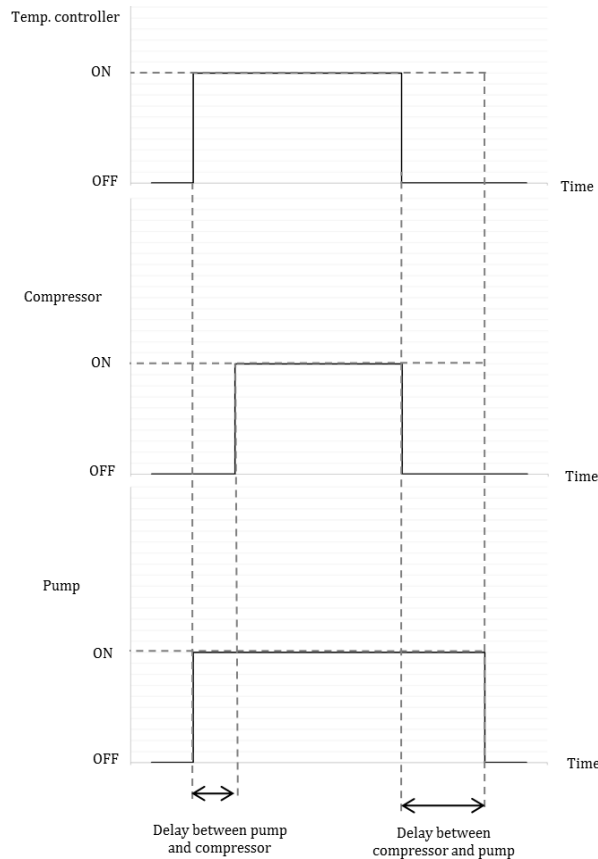
During this function, the flow-switch alarm is deactivated.

8.2 Operation by mean of the thermoregulator (Default)

During this operating mode (**P03=1**, default), the thermo-regulator actuates the circulator; after a time delay of **P01** seconds from the circulator pump startup, the compressor also will turn ON. However, during the power off status, the circulator pump turns off with a delay of **P02** minutes after shutdown status by mean of the thermo-regulator (the shutdown status is corresponding to the off status of the compressor).

If the flow switch alarm is active in automatic reset, the pump is anyway ON even if the compressor is off.

If you enable the operation of the unit from "**DI2**" digital input corresponding to the remote "on-off" the circulator will start operation immediately for 2 minutes regardless of the internal thermoregulation of the unit (the activation of water recirculation in the plant circuit leads to the correct activation of the thermoregulation).



8.3 Operation under thermoregulator call with periodic activation

The function is disabled if **P17= 0** (default). If the pump is set to operate by thermo-regulator actuation (**P03 = 1**, default), it will be activated periodically for a duration given by the parameter **P17** (in seconds) after a counting time set by the parameter **P16** (in minutes), activated when the thermoregulation is fulfilled and the pump turned off.

In case of activation of the flow switch alarms with automatic reset the pump is still ON even if the compressor is off.

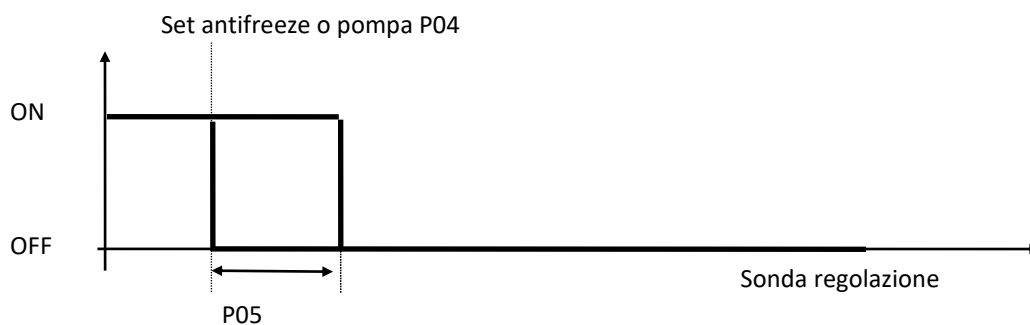
The periodic function is interrupted also in case of intervention of the antifreeze thermo-regulator which leads to the forced operation of the pump.

8.4 Hydraulic pump in anti-freezing operation

If the setting temperature is too low and the pump is off, the pump will be activated automatically.

Pa **P04** set antifreeze pump activation

Pa **P05** hysteresis pump in antifreeze



8.5 Continuous operation

In this mode of operation (active if **P03 = 0**), the pump is always ON. It turns off only when the unit stops to operate.

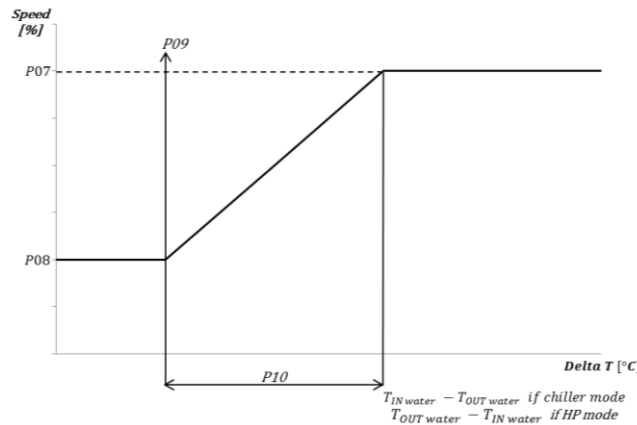
8.6 Linear regulation of the circulator – double ΔT_{Water} –

The analog output varies according to difference in temperature between water inlet and water outlet of the heat exchanger.

- **P06** set $\Delta T_{\text{Water inlet/outlet}}$ of modulating pump in heating mode
- **P07** maximum speed of the modulating pump
- **P08** minimum speed of the modulating pump
- **P09** set $\Delta T_{\text{Water inlet/outlet}}$ of the modulating pump in cooling mode.
- **P10** Modulating pump linear band
 - In cooling mode: $[T_{\text{Water inlet}}] - [T_{\text{Water outlet}}]$
 - In heating mode: $[T_{\text{Water outlet}}] - [T_{\text{Water inlet}}]$

Example in cooling:

If the difference in temperature between water inlet and outlet is greater than **P09 + P10**, the pump will run at maximum speed. If the difference temperature between water inlet and outlet is less than **P09 - 0.2°C**, the pump will run the minimum speed. In the other cases, the pump modulates trying to match the temperature difference with **P09**. For the heating mode, the same considerations are valid with replace only **P06** with **P09**. Please see paragraph 18.6 for changing the parameters.
Warning: During the DHW production mode, the pump is constrained to operate at its maximum speed.



In domestic hot water production mode, the pump will operate at the maximum speed.

8.7 Management of double circulator

You can configure the system to work with 2 pumps.

Parameter P13 shown the utilization logic:

- **P13 = 0:** the pump will work for few hours.
 No change of pump during operation, i.e. this setting can be selected only if it is needed to operate one pump.
- **P13 = 1:** Priority of selection on pump 1.
- **P13 = 2:** Priority of selection on pump 2.

Note:

Each pump has its own thermal protection digital input;
 If one of the pumps is not available because of alarm, the other pump will be selected regardless of the **P13** value.

9 FAN MOTOR CONTROL

The operation of the fan motors is depending on the value read by the pressure sensors. There is a resettable thermal device with immediate rearmament and will act only on fan motor.

9.1 AC fan motor

The condensation control is a function of the condensing pressure in chiller mode and the evaporation pressure in heat pump mode.

The fan speed can be independently controlled from the compressors or under the CALL of the same compressors.

Pa **F05** for fan output mode

0: if all the compressors of the circuit are switched off and the fan is switched off.

1: The condensation control is independent from the compressor.

Switching off the fan motor is bypassed for a period of time equal to Pa **F12** from a circuit's compressor start-up. During this period if the regulator requires the cut-off the fan goes to the minimum speed.

9.2 Star-Delta (Y-Δ) fan motor

For cooling only "HWA1-A" versions, the fan motor is enabled to operate when at least one compressor is running; the fan speed adjustment is depending on the condensation pressure.

If the condensation pressure exceeds **F08** (default 25bar), the fan motor starts and the three-phase windings are starred internally.

When the condensation pressure is greater than the parameter **F14** (default 35bar), the fan motor windings connections switch to triangle type and then the maximum fan speed is started.

If the condensation pressure is less than **F14 - 5 bar**, the fan motor windings switch to star.

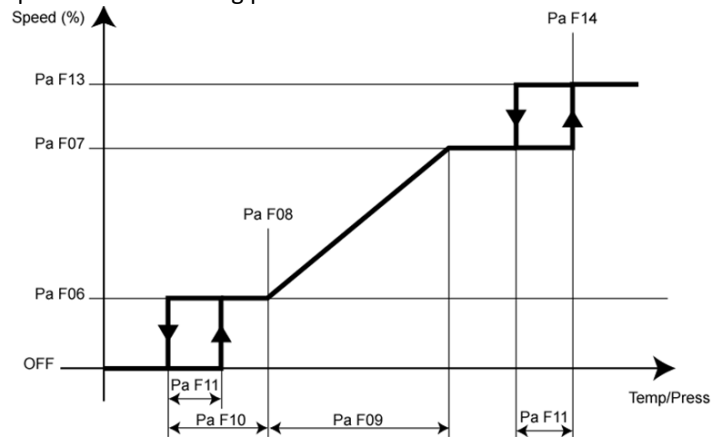
If the condensation pressure is less than **F08 - 5bar**, the fan motor will stop operation.

9.3 EC fan motor control

The fan speed control in cooling mode occurs according to the diagram shown below, where:

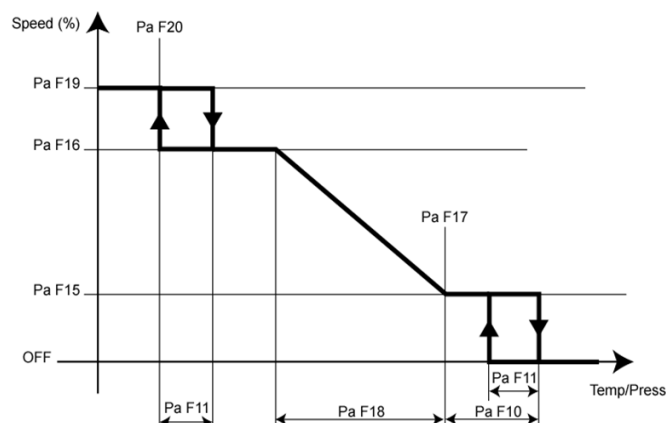
- F06** = Minimum fan speed in cooling mode;
- F07** = Maximum silent fan speed in cooling mode
- F08** = Set temperature/pressure to the minimum fan speed in cooling mode
- F09** = Fan motor linear band in cooling mode
- F10** = Delta cut-off of the fan

- F11** = Cut-off hysteresis and silent/maximum fan speed
- F13** = Maximum fan speed in cooling mode
- F14** = Set temperature/pressure to the maximum fan speed in cooling mode
- F6-F10** = Set forced fan stop for low condensing pressure



The fan operation control in heat pump mode occurs following the diagram shown below, where:

- F10 = F10** = Delta cut-off of the fan motor in cooling/heating
- F11** = Cut-off hysteresis in cooling/heating
- F15** = Minimum fan speed in heating mode
- F16** = Maximum silent fan speed in heating mode
- F17** = Set pressure for minimum fan speed in heating mode
- F18** = Fan speed linear band in heating mode
- F19** = Maximum fan speed in heating mode
- F20** = Set pressure for the maximum fan speed in heating mode
- F17+F10** = Set forced fan stop for high evaporating pressure



The fan speed can be controlled via analog/digital outputs or, alternatively, via serial on the same serial of the modulating compressor. Please see paragraph 17.5 for changing the parameters.

10 Defrosting cycle management

The defrost cycle function is available only in heat pump mode and is used to prevent the frost formation on the surface of the air/air coil. The frost formation on the evaporator, which occurs more frequently at very low ambient temperatures, in addition to greatly decreasing the thermal efficiency of the unit, it can lead to the risk of damaging the unit itself. The adjustable parameter **d01** enables the defrost operation (=1 enabled defrosting).

10.1 Forced manual defrost

If the appliance is ON and in heating mode, you can force manually the defrosting mode by pressing the UP, DOWN, and ENTER buttons for 3 seconds.

The same thing can be done via serial, sending the modbus 200 register value '-1'. This writing will not change the state of the appliance, but only leads to forced manual defrost.

11 ANTIFREEZE PROTECTION ELECTRIC HEATERS (IF THE KA ACCESSORY IS PRESENT)

The antifreeze electric heaters (installed on the outer surfaces of the evaporator plates) and the heating cable placed on the basement of the appliance turns on when the outdoor air temperature decreases below 3°C and the unit goes in defrosting operation (or if **r19=0** even if the unit is not in defrosting cycle, or in stand-by mode). The previous heaters will be stop operation if the outdoor temperature exceeds 5°C or the last defrosting is terminated after more than **r19** minutes (default 10 minutes) (with **r19≠0**).

In case you want to produce gelid water, it is necessary to modify the actions of antifreeze resistances, as well as the set of activation of the antifreeze alarm (**A08** = 4°C by default) and its hysteresis (**A09** = 3.0°C by default).

12 REMOTE ON/OFF CONTROL

The ON/OFF function is already enabled by default. Remove the bridge of the terminal block then the unit will be placed in stand-by mode (in such status the display of the on-board unit controller will show the "E000" code). When the contact is closed, the machine exits from standby mode and the circulation pump will run for 2 minutes.

To modify this function, enter at the parameters PRG→PSS→PRG→(introduce the maintainer password)→PRG→PAR→PRG→CnF. See paragraph 17.2.

Parameter	Unit	Value	Description	Terminals	Notes
H47	Num	2 (default)	Remote On/Off digital input	ID3-ID3	Voltage free digital input

13 SIGNALIZATIONS FOR HWA1-A MODELS

In cooling-only versions, on the **DO7 - DO7N** terminals (Parameter **H85**), you can set a 230Vac signal output voltage by setting the following user parameters by entering the installer password in the control panel that is situated on the front panel.

Values	Description																						
21	Signalization of defrosting period <ul style="list-style-type: none"> The digital output is activated at the beginning of defrosting cycle, once the Pa d06 time period has terminated The digital output is deactivated at the end of defrosting cycle, once the Pa d07 time period is terminated. 																						
24	Signalization heat pump alarm																						
31	Signalization plant season. <ul style="list-style-type: none"> The output is active in COOLING operation The output is not active in heating operation The output is not active when the unit s OFF. During the DHW production and defrosting cycle, the output keeps the settings of the provenance season.																						
47	The output is activated if one the below alarms is active with the following conditions must be fulfilled: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Alarm</th> <th>Recovery condition</th> </tr> </thead> <tbody> <tr><td>E001</td><td>Manual</td></tr> <tr><td>E002</td><td>Manual</td></tr> <tr><td>E005</td><td>Manual</td></tr> <tr><td>E006</td><td>Manual</td></tr> <tr><td>E008</td><td>Manual</td></tr> <tr><td>E018</td><td>Automatic</td></tr> <tr><td>E041</td><td>Manual</td></tr> <tr><td>E101</td><td>Automatic</td></tr> <tr><td>E102</td><td>Automatic</td></tr> <tr><td>Sensor error</td><td>Automatic</td></tr> </tbody> </table>	Alarm	Recovery condition	E001	Manual	E002	Manual	E005	Manual	E006	Manual	E008	Manual	E018	Automatic	E041	Manual	E101	Automatic	E102	Automatic	Sensor error	Automatic
Alarm	Recovery condition																						
E001	Manual																						
E002	Manual																						
E005	Manual																						
E006	Manual																						
E008	Manual																						
E018	Automatic																						
E041	Manual																						
E101	Automatic																						
E102	Automatic																						
Sensor error	Automatic																						

13.1 Machine lockout signalization

You can configure a digital output for the machine lockout warning. One of the DO must be configured with the value 47 in order to enable this type of output.

The output switches will be activated if one of the following alarms is active with the following conditions:

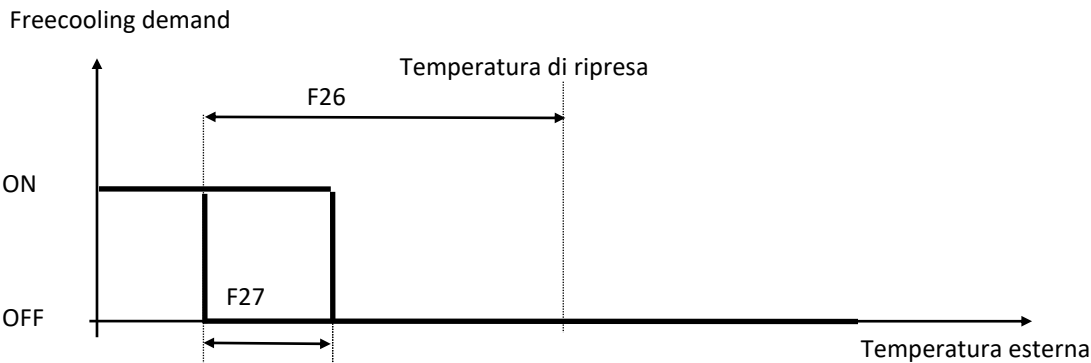
14 OTHER CONTROL FUNCTIONS WITH THE PLANT MANAGEMENT GI-MODULE (optional)

The presence of GI optional plant management kit allows you to get a third controller located inside the electrical board acting as an I/O ports expansion module. By mean of this last controller, it is therefore possible to increase the number of logic functions that can be managed by the main controller; in particular, these logic functions concerns the plant management, as described below. The following functions can be activated by the on-board controller which is located on the front panel of the unit.

14.1 Free-cooling

The free-cooling function allows the pre-cooling of the plant return water using air heat exchanger if allowed by the climatic conditions. The function is active in cooling mode.

Herein below is reported the chart showing the free-cooling activation demand based on the outdoor and intake temperatures:



The free-cooling demand will be activated when the outdoor temperature is lower with **F26** than the intake temperature. After activation of the free-cooling, it will stop when the outdoor temperature increases above $T_{\text{intake}} - F26 + F27$. The free-cooling control valve is active when free-cooling demand is active.

14.1.1 Ventilation in freecooling

When the free-cooling control valve is active:

When compressors are active, or if compressors are called, the ventilation starts as described in the condensation control controller.

If the compressors switch off for satisfied thermoregulation, the ventilation logic switches the control to free-cooling demand with the following modes:

- The ventilation is forced at maximum speed (100%) for the first **F25** minutes.
- When the time defined by **F25** is terminated, the regulation becomes PI type with band given by **b01**, the setpoint is that of the current plant water regulation.
- In case of turning back to the zone of compressors thermoregulation call, the ventilation returns under the condensation control.

14.2 Enablement of domestic hot water production (DHW)

In sanitary mode, the maximum power is employed (like when the thermoregulator is asking always for 100%). However, the various limitations of the maximum frequency associated with the envelope and the limitation for maximum electrical absorption are active.

To activate this function, it is necessary to connect to the **ST2E – ST2E** terminals (enabled as analog input) a temperature sensor which should be placed inside the water tank. Once connecting and placing the sensor, then it is necessary to enable the domestic hot water function.

To enable this function, enter at the parameters PRG→PSS→PRG→(introduce the maintainer password)→ PRG→PAR→PRG→CnF.

I/O port – Parameter	Value	Function
H10	0 (default)	Deactivated function
	1	Active function in heating and cooling mode. The remote on-off function doesn't deactivate the domestic hot water production (DHW).
	2	Active function in heating and cooling mode. The remote on-off function deactivates the domestic hot water production (DHW)
	3	Active function in heating mode. The remote on-off function doesn't deactivate the domestic hot water production (DHW).
	4	Active function in heating mode. The remote on-off function deactivates the domestic hot water production (DHW)
	5	Active function in cooling mode. The remote on-off function doesn't deactivate the domestic hot water production (DHW).
	6	Active function in cooling mode. The remote on-off function deactivates the domestic hot water production (DHW).
H29	6	Activation of domestic hot water temperature sensor DHW (ST7E terminals)
H90	6	DHW valve command (D05E/D05EN terminals)

If the DHW temperature is below the set point value (**PRG->Set->SAN**), the unit activates the sanitary valve and the compressor will be placed at the maximum frequency starting the modulation at 1°C before (setpoint-1°C) the set value and it stops at 1°C after the set value (setpoint+1°C). Once achieved the set point value, the valve switches to the stand-by mode and the compressor works normally.

While shifting from user's to domestic hot water, the operating sensor changes from "outlet water temp. sensor" to "sanitary tank temp. sensor". While shifting from the winter operating mode to the sanitary operating mode, the compressor does not stop operation, and will be placed at the maximum established frequency which can be controlled; however, when shifting from the summer operating mode to the sanitary operating mode, the compressor will stop operation for waiting for the safe period.

The defrost cycle during winter operation mode is always performed on the user side, never on the sanitary water tank.

NOTE:

- If **H10 = 15**, the remote shutdown of the unit (remote on-off) or from the on-board unit controller, or from the remote control panel has no effect on sanitary operating mode. The unit will be placed in sanitary mode as setting priority after its power on. The on-board unit display shows the temperature measured by the sensor placed inside the sanitary water tank. Once the sanitary cycle is completed, the display returns to show the temperature of the outlet water sensor.
- If the remote ON-OFF digital input (onoff-onoff terminals) is open, with enablement of the function of domestic hot water (**H10=1** and **H20=6**), the display on-board unit shows the code "**SAN**". Once the sanitary cycle is concluded, the display returns to show the code "**E00**" indicating that the remote ON-OFF contact is open.
- If **H10 = 2**, the remote on-off function disenables the production of domestic hot water and also the operation of the heat pump in heating and cooling on plant side.

14.2.1 MEMORIZATION OF THE SENSOR IN HEATING MODE

In the case of commutation from water users to the domestic hot water, the temperature sensor changes from a "water outlet temperature sensor" to a "water tank temperature sensor". For such reason, in heating mode, the last value read by the sensor will be memorised before changing to DHW mode.

When the DHW thermoregulation is reached, the reference temperature on the plant side will take the value which is previously memorised.

The memory function will be interrupted:

- When the temperature detected by the sensor becomes lower than the memorized value;
- Or after a period equal to **b06** seconds (default 45 seconds).

14.2.2 SANITARY MODE CALL FROM DIGITAL INPUT

In the case where a digital input is configured for sanitary water mode call (instead of the sensor), the heat pump will be placed in sanitary mode when the digital input is closed (the same behaviour is obtained when DHW temperature sensor < (set of DHW – Pa **b03**) and exits from the DHW production when the digital input is open.

Note: If a temperature sensor is installed and configured, this management will be ignored and the thermoregulation will be done on the basis of the detected temperature by the sensor.

To enable this function, enter at the parameters PRG→PSS→PRG→(introduce the maintainer password)→PRG→Par→PRG→CnF.

I/O port – Parameter	Value	Description	Function
H62	28	Digital input for sanitary mode call from digital input	Close contact → Heat pump in sanitary mode. Open contact → Heat pump in plant system mode.

(*). Otherwise, it is possible to use another digital input.

In the case where a digital input is configured for sanitary water function call (instead of the sensor), the heat pump will be placed in sanitary mode when the digital input is closed and exits from the DHW production when the digital input is open.

The DHW setpoint of the heat pump is not considered here, its management is the designer’s responsibility, who must take into consideration the DHW protection and the configuration of the whole system.

Note: It is possible to invert the polarity of the digital input, for such purposes please contact our technical office.

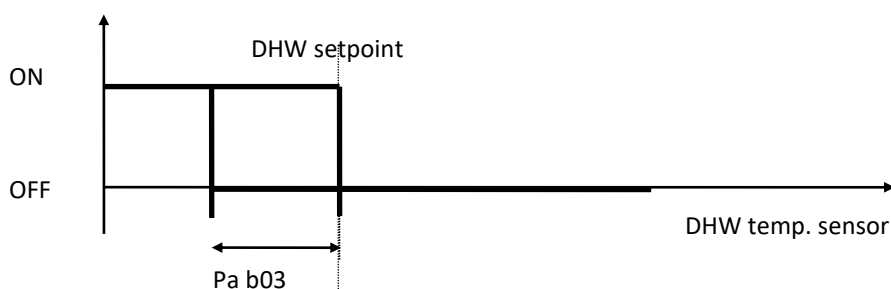
14.2.3 REGULATOR IN COOLING

If the DHW temperature is below the sanitary water set - Pa **b03**, the sanitary valve is activated and the compressor is switched off. When the safe time period is terminated, the compressor change setting to the nominal frequency for domestic hot water (see nominal frequency calculation) until achieving set of domestic hot water. At this point, the sanitary valve will stop and then the compressor will stop. Once the safe time period is terminated, the chiller resumes the normal regulation.

14.2.4 REGULATOR IN HEATING

If the sanitary water temperature is below the **sanitary water set - Pa b03**, the DHW valve will be activated without switching off the compressor which will change frequency to the rated one (see calculation of the nominal frequency of the compressors in sanitary mode) until the temperature achieves the set of 'sanitary water. At this point, the sanitary valve switched off and the unit will resume normal operation.

14.2.5 SANITARY VALVE REGULATOR



14.2.6 HEATING MODE ON DOMESTIC HOT WATER TANK

If the parameter **Pa H130** is set to be **1**, the unit uses the domestic hot water tank also for heating the plant side. Under these conditions, therefore, the relay that controls the domestic hot water will be excited even during heating mode operation and not only in sanitary mode.

During the defrosting cycle and cooling mode, the valve will stop operation.

14.3 SUMMER/WINTER MODE REMOTE COMMUTATION

Remote possibility of controlling the heating/cooling mode of the heat pump.

To enable this function, enter at the parameters PRG→PSS→PRG→(introduce the maintainer password)→PRG→PAr→ PRG→CnF

See paragraph **Errore. L'origine riferimento non è stata trovata.**

Parameter	Unit	Value	Description	Terminals	Notes
H57	Num	3	Digital input for operazioni mode management. Open contact → heat pump in "cool" mode, Close contact → unit operates in "heat" mode.	ID3E- ID3E	Voltage free digital input



14.4 PLANT REMOTE CONTROL (MANAGEMENT)

It is possible to enable a plant temperature sensor in order to allow the on-board unit controller to correctly manage the regulation.

To enable this function, enter at the parameters PRG→PSS→PRG→(introduce the maintainer password)→PRG→PAr→ PRG→CnF

Parameter	Value	Description	Terminals
H30	41	Enablement of the plant remote temperature sensor	ST8E- ST8E

The plant circuit remote sensor adjusts the heat pump temperature only during the startup period of the compressor(s), the shutdown is managed by the outlet temperature sensor of the heat pump. For more explanation herein below is reported an illustrating table regarding the operation of the system:

Mode of operation	Active call of the heat pump
 Heating	Temperature detected by the outlet sensor of the heat pump < setpoint Hea - b05 and Temperature detected by the plant circuit remote sensor < water setpoint Hea - (b22 - b05)
 Cooling	Temperature detected by the outlet sensor of the heat pump > setpoint Coo + b05 and Temperature detected by the plant circuit remote sensor > setpoint Coo + (b22 - b05)

NOTE: b05=1°C; b22=5°C.

14.5 DOUBLE SET-POINT MANAGEMENT

The double set-point function introduces a second working set-point of the plant side (in both cooling and heating mode).

It is possible to configure in the user terminal block a digital input allowing the transition from the first to the second set-point and vice versa.

14.5.1 SETTINGS

The parameter "**H129**" of double setpoint mode setting (from maintainer menu):

H82	OPERATION
1	Classic mode
2	Double setpoint active in the summer
3	Double setpoint active in the winter
4	Double setpoint active in the summer and winter

To activate the function enter with maintainer password to the parameters:

Parameter	Unit	Default	Value	Description	Terminals	Notes
H57	Num	0	26	Digital input for second setpoint	ID3E – ID3E	-
H90	Num	0	25	Under-voltage output for 3 way valve for radiant panels	DO5E(phase) DO5EN(neutral)	Under voltage output single phase 230Vac, 50Hz, 5A resistive, 1A inductive to connect relay coil for obtaining a free contact.

The under-voltage output with live contact for switching from first to second set-point and vice versa. This can be used, for example, for switching a hydronic valve for to divert the water flow between the radiant system and the ventilation system. If it is needed a relay should be used for the hydronic valve power supply.

14.5.2 ADJUSTABLE SETPOINTS

Setpoint type	Setpoint (summer/winter)	Summer	Winter
First setpoint (°C)	Coo/Hea	7 (5÷18)	45 (35÷57)
Second setpoint (°C)	Co2/He2	18 (7÷23)	35 (25÷45)

For setting the setpoint from the conboard control panel, you can use the SET button.

The second setpoint is greater than the first setpoint in the summer and lower in the winter:

- in the summer: $T2 \geq T$
- in the winter: $T2 \leq T$

14.5.3 COMMUTATIONS

The commutation sequence from first (normal) set-point to the second setpoint:

- in the summer: Commutation of the 3-way valve only when the second set-point -5°C is achieved.
- in the winter: commutation of the 3-way valve only when the second set-point +5°C is achieved (at any case after 5min from setpoints modification, the commutation of the valve will be carried out)

The commutation sequence from second set-point to the first setpoint:

- Commutation of the 3-way valve
- Modification of the operating setpoint after a lap of time equal to the required time for opening of the 3-way valve.(default **b04=30s** from maintainer menu)

14.6 MANAGEMENT OF A SECONDARY CIRCULATOR (RELAUNCHING PUMP)

As an alternative to the double set-point function, it is possible management of a secondary or relaunching circulating pump to serve the plant system.

An ambient thermostat must be appropriately configured (NC state) connected on the terminals DI3E-DI3E.

- Thermostat contact normally open → the secondary circulator will be activated;
- – Thermostat contact normally closed → the secondary circulator is off with a delay given by P02 (post-pumping)

To enable this function, enter at the parameters menu PRG→PSS→PRG→(introduce the maintainer password)→PRG→PAr→PRG→CnF

Parameter	Unit	Value	Description	Terminals	Note
H57	Num	19	Digital input for thermostat call	ID3E ID3E	-
H90	Num	43	Under voltage output for secondary circulator	DO5E(phase) DO5NE(neutral)	Under voltage output single phase 230Vac, 50Hz, 5A resistive, 1A inductive to connect relay coil for obtaining a free contact.

The thermoregulation of the pump is depending on the thermostat call.

With Heat Pump in Off, the secondary circulator will stop operation independently than the thermostat call.

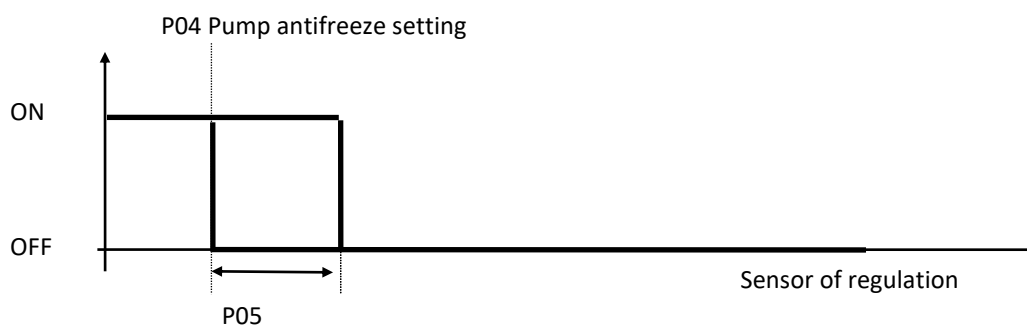
14.6.1 ANTIFREEZE CONTROL OF PLANT SECONDARY PUMP

If the remote plant sensor is configured, there is an antifreeze control on the secondary circulator.

If the regulation temperature is too low and the pump is off, it will start automatically to operate in case of:

Pa **P04**: Setting parameter of pump operation in antifreeze cycle

Pa **P05**: Pump hysteresis in antifreeze cycle



15 SIGNALIZATIONS' MANAGEMENT

On the DO5E/DO5NE (Parameter H90), you can set a 230Vac signal output by setting the following user parameters by entering the installer password in the controller situated on the front panel.

Value	Description																						
21	Signalization of defrosting period <ul style="list-style-type: none"> The digital output is activated at the beginning of defrosting cycle, once the Pa d06 time period has terminated The digital output is deactivated at the end of defrosting cycle, once the Pa d07 time period is terminated. 																						
24	Signalization of heat pump alarms																						
31	Signalization of plant season <ul style="list-style-type: none"> The output is active in cooling mode operation The output is not active when the unit is in heating mode operation The output is not active if the unit is OFF. During the DHW production and defrosting cycle, the output keeps the settings of the provenance season.																						
47	The output is activated if one the below alarms is active and the following conditions must be fulfilled: <table border="1" data-bbox="592 517 1126 891"> <thead> <tr> <th>Alarm</th> <th>Reste condition</th> </tr> </thead> <tbody> <tr><td>E001</td><td>Manual</td></tr> <tr><td>E002</td><td>Manual</td></tr> <tr><td>E005</td><td>Manual</td></tr> <tr><td>E006</td><td>Manual</td></tr> <tr><td>E008</td><td>Manual</td></tr> <tr><td>E018</td><td>Automatic</td></tr> <tr><td>E041</td><td>Manual</td></tr> <tr><td>E101</td><td>Automatic</td></tr> <tr><td>E102</td><td>Automatic</td></tr> <tr><td>Sensor error</td><td>Automatic</td></tr> </tbody> </table>	Alarm	Reste condition	E001	Manual	E002	Manual	E005	Manual	E006	Manual	E008	Manual	E018	Automatic	E041	Manual	E101	Automatic	E102	Automatic	Sensor error	Automatic
Alarm	Reste condition																						
E001	Manual																						
E002	Manual																						
E005	Manual																						
E006	Manual																						
E008	Manual																						
E018	Automatic																						
E041	Manual																						
E101	Automatic																						
E102	Automatic																						
Sensor error	Automatic																						

16 HANDBOOK FOR SOME CONFIGURATIONS OF INSTALLATION

For more information about some configurations, you can contact our office and ask for the handbook which collects a series of some recommended highlighted drawings of plants regarding the installation configurations of our high efficiency heat pumps. The "Handbook" shows the symbiotic potential with some of our products in the catalogue.

17 TABLES OF ALLOWED CONFIGURATIONS FOR THE USER AND INSTALLER

The parameters can be activated and/or edited by user or when using the installer password to get access in the CB Control menu which is located on the front panel of the unit.

DESCRIPTION	GROUP IDENTIFICATION CODE	PARAMETER INDEX	VISIBILITY
Configuration	CnF	H-	USER/INSTALLER
Compressor	CP	C-	INSTALLER
Fan motor	FAn	F-	INSTALLER
Alarms	ALL	A-	INSTALLER

17.1 SETPOINT CONFIGURATION PARAMETERS

SETPOINT CONFIGURATION PARAMETERS							
Parameter	Description	Unit	Default	Range	Visibility	Allowed configuration	Notes
Coo	First setpoint in cooling mode	°C	11 (mod. 255-272) 12 (mod. 142)	H03±20.0	USER		

17.2 CONFIGURATION PARAMETERS

Parameter	Description	Unit	Default	Range	Visibility	Allowed configurations	Notes
H03	Maximum set point in cooling	°C	23.0	-50.0÷80.0	INSTALLER		
H04	Minimum set point in cooling	°C	9 (mod. 255-272) 10 (mod. 142)	-50.0÷80.0	INSTALLER		
H47	DI3 configuration	/	2	0÷30	INSTALLER	0 = input not assigned 2 = Remote On / Off	Terminal: DI2/ DI2
H80	D02 under voltage digital output	/	0	0÷47	INSTALLER	0 = output not assigned 24 = alarm notification	Under voltage output 230Vac, 50Hz, 5A resistive, 1A inductive; Terminals of exchange contact NC1, N1, NO1.
H126	Serial address	/	1	1÷120	INSTALLER	In case of installing 2 units or more in cascade configuration, you have to assign different addresses for each controller.	

17.3 CONFIGURATION PARAMETERS OF THE ALARMS

CONFIGURATION PARAMETERS OF THE ALARMS							
Parameter	Description	Unit	Default	Range	Visibility	Allowed configurations	Notes
A16	Low pressure set in cooling operation	Bar	according to the model	4,0÷80,0	INSTALLER		

17.4 SETTING PARAMETERS

REGULATION PARAMETERS

Parameter	Description	Unit	Default	Range	Visibility	Allowed configurations	Notes
b01	Band in cooling mode	°C	1.5 (mod. 255-272) 2 (mod. 142)	0÷10,0	INSTALLER		
b05	Hysteresis cut-off of the compressor in Cooling and heating	°C	1	0.0÷25.5	INSTALLER	Recommended values included between 1 and 1.5 Other different values can ensure the proper operation of the unit.	
b09	Max Offset in cooling	°C	3.0	-50.0÷80.0	INSTALLER		
b11	Outdoor set temperature in cooling	°C	25	-127÷127	INSTALLER		
b12	Outdoor set temperature in heating	°C	15	-127÷127	INSTALLER		
b13	Temperature differential in cooling	°C	-10.0	-50.0÷80.0	INSTALLER		
b16	Scan time of compressors start-up	sec	1	0÷255	INSTALLER		
b20	Enabling of 0-10V/ratiometric input	/	0	0÷1	INSTALLER	0 = 0-10V input 1 = ratiometric input	
b25	Compressor regulation delta cut-on hysteresis in cooling and heating modes	°C	1	0.0÷25.5	INSTALLER		

17.5 CONDENSATION PARAMETERS

CONDENSATION PARAMETERS


Parameter	Description	Unit	Default	Range	Visibility	Allowed configurations	Notes
F08	Set of the pressure at the minimum fan speed in cooling mode	Bar	23.0	-50.0÷80.0	INSTALLER		
F11	Hysteresis cut-off	Bar	5.0	0.0÷25.5	INSTALLER		
F14	Setting of the pressure at the maximum fan speed in cooling mode	Bar	30 (mod. 255-272) 33 (mod. 142)	-50.0÷80.0	INSTALLER		

17.6 COMPRESSOR PARAMETERS' CONFIGURATION

COMPRESSOR PARAMETERS CONFIGURATION

Parameter	Description	Unit	Default	Range	Visibility	Allowed Configurations	Notes
n01	Output power from PC1	/	100	0÷100	INSTALLER		
n02	Output power from PC2	/	according to the model	0÷100	INSTALLER		
n06	Compressors Lock Mode for installer	/	0	0÷1	INSTALLER	0 = Deactivated function 1 = Lockout	

18 USER AND INSTALLER ALLOWED CONFIGURATION TABLES

 WARNING	<i>All the operations with installer visibility must be carried out by qualified personnel.</i>
	<i>Not all the configurations can be simultaneously enabled and/or changed.</i>
	<i>Other values different than those of default may ensure the proper operation of the unit, in case of necessity contact please our office.</i>
	<i>The company excludes any contractual and extra contractual liabilities for damages caused to persons, animals or objects, by incorrect installation, setting and maintenance, improper use of the equipment, and the partial or superficial reading of the information contained in this manual</i>

The parameters can be activated and/or modified by the user or by entering the installer password in the controller that is located on the front panel of the unit.

DESCRIPTION	GROUP IDENTIFICATIVE CODE	INDEX OF THE PARAMETER	VISIBILITY
Configuration	CnF	H-	USER/INSTALLER
Compressor	CP	C-	INSTALLER
Fan motor	FAn	F-	INSTALLER
Alarms	ALL	A-	INSTALLER
Regulation	Re	b-	INSTALLER
Pump	PUP	P-	INSTALLER
Electric heaters	Fro	r-	INSTALLER
Defrosting	dFr	d-	INSTALLER
Electronic valve	EEu	U-	INSTALLER
Offset	OFF	o-	INSTALLER
Inverter compressors	nCP	n-	INSTALLER

18.1 SET-POINT'S CONFIGURATION PARAMETERS

Parameter	Description	Unit	Default	Range	Visibility	Allowed configurations	Notes
Coo	First setpoint in cooling	°C	7.0	H03÷Co2	USER		
Hea	First setpoint in heating	°C	45.0	He2÷H01	USER		
San	DHW (sanitary) setpoint	°C	48.0	H02÷H01	USER		
Co2	Second setpoint in cooling	°C	18.0	Coo÷H03	USER		
He2	second setpoint in heating	°C	35.0	H02÷Hea	USER		

18.2 CONFIGURATION PARAMETERS

Parameter	Description	Unit	Default	Range	Visibility	Allowed configurations	Notes
H01	Maximum set point in heating	°C	63.0	-50.0÷80.0	INSTALLER		
H02	Minimum set point in heating	°C	25.0	-50.0÷80.0	INSTALLER		
H03	Maximum set point in cooling	°C	25.0	-50.0÷80.0	INSTALLER		
H04	Minimum set point in cooling	°C	5.0	-50.0÷80.0	INSTALLER		
*H85	Configuration of digital input D07	/	0	0÷47	INSTALLER	0 = input not assigned 21= Defrosting signalization 24= Alarm signalization 31=Plant season signalization 47=Lock signalization	D07, D07N terminals
H126	Serial address	/	1	1÷200	INSTALLER	In case of several units installed in cascade configuration, you have to assign different addresses for each controller.	

(*) Only for HWA1-A version

18.3 ALARM CONFIGURATION PARAMETERS

Parameter	Description	Unit	Default	Range	Visibility	Allowed configurations	Note
A08	Antifreeze alarm activation setting	°C	2	-127÷127	INSTALLER		
A09	Antifreeze alarm hysteresis	°C	3.0	0.0÷25.5	INSTALLER		
A16	Low pressure set in cooling operation	Bar	Based on the model	4,0÷80,0	INSTALLER		
A27	Low pressure set in heating operation	/	1.3	0.0÷25.5	INSTALLER		

18.4 SETTING PARAMETERS

Parameter	Description	Unit	Default	Range	Visibility	Allowed configurations	Note
b01	Band in cooling mode	°C	2,0	0÷10,0	INSTALLER		
b02	Band in heating mode	°C	2,0	0÷10,0	INSTALLER		
b03	Differential in DHW mode	°C	4,0	0÷10,0	INSTALLER		
b05	Hysteresis cut-off of the compressor in cooling and heating	°C	0.5	0.0÷25.5	INSTALLER	Recommended values included between 1 and 1.5 Other different values can ensure the proper operation of the unit	
b06	DHW transitory output in heating	sec	45	0÷255	INSTALLER		
b08	Enabling dynamic set	/	0	0÷1	INSTALLER		
b09	Max Offset in cooling dynamic set	°C	3.0	-50.0÷80.0	INSTALLER		
b10	Max Offset in heating dynamic set	°C	-3.0	-50.0÷80.0	INSTALLER		
b11	Outdoor set temperature in cooling dynamic set	°C	25	-127÷127	INSTALLER		
b12	Outdoor set temperature in heating dynamic set	°C	15	-127÷127	INSTALLER		
b13	ΔT in cooling	°C	-10.0	-50.0÷80.0	INSTALLER		
b14	ΔT in heating	°C	10.0	-50.0÷80.0	INSTALLER		
b15	Setpoint regulation band from 0-10V analog input	°C	5.0	0.0÷10.0	INSTALLER		
b16	Scan time of compressors start-up	sec	60	0÷255	INSTALLER		
b20	Enabling of 0-10V/ratiometric input	/	0	0÷1	INSTALLER	0 = 0-10V input 1 = ratiometric input	
b22	Thermoregulation Hysteresis cut-off plant sensor	°C	1,5	0.0÷25.5	INSTALLER		

18.5 CONDENSATION PARAMETERS

Parameter	Description	Unit	Default	Range	Visibility	Allowed configurations	Notes
F05	Operation under compressor call	/	0	0 ÷ 1	INSTALLER		
F06	Min fan speed	%	30	0 ÷ 100	INSTALLER		
F07	Max silent fan speed in cooling mode	%	Based on the model	0 ÷ 100	INSTALLER		
F08	Set of the pressure at the minimum speed of the fan in cooling mode	Bar	16.0	-50.0÷80.0	INSTALLER		
F09	Proportional band for modulation of the fan in cooling mode	Bar	9	0.0÷25.5	INSTALLER		
F10	Delta cut-off fan adjustment	Bar	2.6	0.0÷25.5	INSTALLER		
F11	Hysteresis cut-off	Bar	1.3	0.0÷25.5	INSTALLER		
F13	Max fan speed in cooling mode	%	Based on the model	0 ÷ 100	INSTALLER		
F14	Set of the pressure at the maximum fan speed in cooling	Bar	28	-50.0÷80.0	INSTALLER		
F15	Min fan speed in heating	%	Based on the model	0 ÷ 100	INSTALLER		
F16	Max. silent fan speed in heating mode	%	Based on the model	0 ÷ 100	INSTALLER		
F17	Set of the pressure at the minimum fan speed in heating	Bar	15.0	-50.0÷80.0	INSTALLER		
F18	Linear band for fan motor modulation in heating mode	Bar	7.0	0.0÷25.5	INSTALLER		
F19	Max. fan speed in heating mode	%	Based on the model	0 ÷ 100	INSTALLER		
F20	Set of the pressure at the maximum fan speed in heating	Bar	6.8	-50.0÷80.0	INSTALLER		
F25	Time of forced free-cooling ventilation at 100%	Minuti	Based on the model	0.0 ÷ 25.5			
F26	Outdoor temperature Offset for free-cooling activation	°C	Based on the model	-12.7 ÷ 12.7			
F27	Free-cooling deactivation hysteresis	°C	Based on the model	-12.7 ÷ 12.7			

18.6 CIRCULATOR PUMP CONFIGURATION PARAMETERS

Parameter	Description	Unit	Default	Range	Visibility	Allowed configurations	Note
P01	Pump ON Compressor ON delay	sec	20	0÷255	INSTALLER		
P02	Pump OFF compressor OFF delay	min	2.0	0÷255	INSTALLER		
P03	Pump operation mode	/	1	0÷1	INSTALLER	0 = continuous operation 1 = operation according to the thermoregulation	
P04	Set of the pump in antifreeze	°C	5	-127÷127	INSTALLER		
P05	Pump's hysteresis in antifreeze mode	°C	2.0	0.0÷25.0	INSTALLER		
P06	Pump proportional band in heating	°C	Based on the model	0.0÷25.0	INSTALLER		
P07	Maximum speed of modulating pump	%	100	0÷100	INSTALLER		
P08	Minimum speed of modulating pump	%	Based on the model	0÷100	INSTALLER		
P09	Set ΔT [°C] $T_{water\ inlet/outlet}$ of modulating pump	°C	5	-127÷127	INSTALLER		
P10	ΔT of modulating pump	°C	2.0	0.0÷25.0	INSTALLER		
P16	Time between 2 activations of the pump in periodic mode	min	20	0÷600	INSTALLER		
P17	Time of operation of the pump in periodic mode	sec	90	0÷255	INSTALLER	0 = deactivation of periodic mode	
P18	Enabling of unique pump operation in network	/	0	0÷1	INSTALLER	0 = deactivated function 1 = enabled function	
P19	Unique pump operation in network in presence of offline machines	/	0	0÷1	INSTALLER		

18.7 DEFROSTING PARAMETERS

Parameter	Description	Unit	Default	Range	Visibility	Allowed configurations	Note
d02	Pressure during initial defrosting	bar	5.8	-50.0÷80.0	INSTALLER		Parameters enabled only if are configured by default
d08	Minimum interval between 2 consecutive defrosting cycles	min	0	0÷255	INSTALLER		After a time equal to d08, the circuit enters in defrosting mode.

18.8 COMPRESSOR CONFIGURATION PARAMETERS

Parameter	Description	Unit	Default	Range	Visibility	Allowed configurations	Note
n01	Output power from PC1	%	Based on the model	0÷100	INSTALLER		
n02	Output power from PC2	%	Based on the model	0÷100	INSTALLER		
n06	Compressors Lock Mode for installer	/	Based on the model	0÷1	INSTALLER	0 = Operation 1 = Lockout	
C11	Operation time of compressor with minimum frequency	sec	60	0÷255	INSTALLER		

18.9 CONFIGURATION PARAMETERS OF "GI" Module – PLANT MANAGEMENT – (Optional)

Parameter	Description	Unit	Default	Range	Visibility	Allowed Configurations	Notes
H10	Enablement of DHW mode	/	0	0÷2	INSTALLER		
H29	Configuration of the analog input ST7E	/	0	0÷49	INSTALLER	0 = input not assigned 6 = Sanitary water temp. remote sensor	ST7E, ST7E terminals
H30	Configuration of the analog input ST8E	/	0	0÷49	INSTALLER	0 = input not assigned 41 = Plant water temp. remote sensor	ST8E, ST8E terminals
H90	Configuration of the digital output DO5E	/	0	0÷47	INSTALLER	0 = output not assigned 6 = Sanitary valve 25 = Double set point valve 43 = Secondary circulator	DO5E, DO5EN terminals
H57	Configuration of the digital input ID3E	/	0	0÷26	INSTALLER	0 = Function not active 26 = Double set point 28 = Sanitary mode call	ID3E, ID3E terminals
H129	Enablement of double setpoint function	/	0	0÷4	INSTALLER	0 = Function not active 1 = Classic mode 2 = Double setpoint in the summer 3 = Double setpoint in the winter 4 = Double setpoint in the summer and winter	
H130	Heating with sanitary accumulator	/	0	0÷1	INSTALLATORE	0 = Function not active 1 = in heating always turned towards the sanitary	

19 ALARMS MANAGEMENT

Herein below the main alarms messages are reported.

Note: When manual reset is performed after N time of interventions, the alarm counting occurs with minute granularity (ie multiple interventions within 1 minute are counted as a single intervention).

19.1 E000 – REMOTE ON/OFF

The E000 code will be displayed when the unit is controlled from a remote digital input.

19.2 E001 – HIGH PRESSURE

If the on board pressure transducer detects a pressure higher than 41,4bar, the alarm will be activated.

In this case the compressor will stop immediately via software. The alarm will reset when the pressure decreases under 32,4 bar.

If the number of alarm interventions in one-hour is equal to 3 times, it will become manual reset.

In addition, there is an on-board unit pressure switch that when it detects a pressure greater than 42±1.5bar, disconnects the compressors from power supply. The reset is manual of the pressure switch and is possible at 33±2bar.

19.3 E002 – LOW PRESSURE

If the on board pressure transducer detects a pressure lower than value set from the controller (**A16=5** bar by default in cooling mode, 1.5 bar in heating mode) the alarm will be activated. In this case the compressor will stop immediately. The alarm will reset when the pressure goes over a hysteresis of 2.0bar.

If the alarm occurs more than 3 times per hour, the alarm becomes a manual reset.

19.4 E003 – COMPRESSOR (C1) THERMAL PROTECTION

These alarms are assigned with digital input. The alarm will be activated when the concerned digital input switches to the active state. It resets automatically when the contact returns to its rest state.

19.5 E013 – COMPRESSOR (C2) THERMAL PROTECTION

These alarms are assigned with digital input. The alarm will be activated when the concerned digital input switches to the active state. It resets automatically when the contact returns to its rest state.

19.6 E004 – FAN MOTOR THERMAL PROTECTION

These alarms are assigned with digital input. The alarm will be activated when the concerned digital input switches to the active state. It resets automatically when the contact returns to its rest state.

19.7 E005 – ANTIFREEZE ALARM

The alarm will be activated when the outlet water temperature sensor is less than 4°C. It turns off when the temperature becomes higher than +7°C.

19.8 E006 – FLOW SWITCH ALARM

The water side flow switch is already installed inside the unit and must NOT be tampered or bypassed in any way. The flow switch is bypassed for 10 seconds from the start-up of the machine. The alarm signalization occurs after 5 seconds of error persistence (lack of water flow, air in the circuit, etc.). The alarm is automatically reset for the first 2 times and goes off after 5 seconds. If the alarm occurs more than 3 times per hour, the manual reset of the alarm is required.

The alarm is not active for 10 seconds after activating the circulator.

19.9 E009 – HIGH DISCHARGE TEMPERATURE

In the case of a unit with the optional “Gi” module, there is a compressor discharge sensor with the following management of high discharge temperature:

If the discharge temperature exceeds Pa **C64**, the **E009** alarm appears and the compressors stop operation.

If the discharge temperature drops below Pa **C65**, the alarm disappears and the compressors are again ready to operate.

19.10 E016 USAGE PUMP 1 THERMAL PROTECTION

The alarm will be activated when the concerned digital input switches to the active state. It resets automatically when the contact returns to its rest state.

In case of alarm, the pump in matter will be blocked. If there is no other resources to use (1 serviceable pump only or both unserviceable pumps) obviously the whole unit will be blocked.

19.11 E026 USAGE PUMP 2 THERMAL PROTECTION

The alarm will be activated when the concerned digital input switches to the active state. It resets automatically when the contact returns to its rest state.

In case of alarm, the pump in matter will be blocked. If there is no other resources to use (1 serviceable pump only or both unserviceable pumps) obviously the whole unit will be blocked.

19.12 E018 – HIGH TEMPERATURE

If the water outlet sensor records a value higher than 65°C for at least 50 seconds, the alarm is active. The alarm goes off when the temperature becomes below than 62°C.

19.13 E042 – POOR HEAT EXCHANGE

This alarm will be activated only during sanitary hot water production and goes on during this operating mode when the outlet temperature exceeds the parameter **H01**. When the alarm goes on, the compressors stop to operate. The alarm goes off if the return temperature drops below the **H01 - b03** threshold, and in this case the compressors are again ready to start-up.

If the alarm goes on for 3 consecutive times during the same sanitary production cycle, it temporarily inhibits sanitary production and the unit returns to operate for the plant side.

The inhibition of sanitary hot water production will be cancelled when the plant regulation achieves below the setpoint value with **b05** or in any case, if there is no need of thermoregulation on the plant.

Note: The **E042** alarm remains active all along the entire cycle of sanitary hot water production.

19.14 E101 - I/O MODULE COMMUNICATION TIMEOUT

There is 10-second of timeout for communication between the main board and its I/O expansion boards.

If the communication fails, the automatic reset alarm goes on.

The alarm is only managed if the I/O configuration requires the presence of the module in matter.

These alarms lock the whole unit because a priori do not know what functions are associated with the I/O ports on the module which does not communicate.

19.15 [E611÷E682] TEMPERATURE SENSORS ALARMS

The sensor alarms are all auto-reset type. The alarm of a given sensor inhibits the functions which need its value. For each encoding, see the table below.

Conditions of alarm sensor:

- Disconnected sensor.
- Short-circuit sensor.
- Sensor records a wrong range of temperature.

Temperature sensor characterization: NTC-10kΩ a 25°C Ø3435

19.16 POWER FAILURE

After power supply reset:

- The system comes back to the previous state before the power failure.
- If the system is in defrosting period, this mode will be cancelled after power supply reset.
- All the running timings will be cleared and reset again.

19.17 ALARMS' LIST

In case of alarm, an error code will appear on the **controller's display**.

Code	Description	Lockout
E000	Remote switch Off of the unit	Unit
E001	High pressure alarm	Unit
E002	Low pressure alarm	Unit
E003	Compressor 1 thermal overload protection	Compressor 1 (C1)
E013	Compressor 2 thermal overload protection	Compressor 2 (C2)
E004	Fan motor 1 thermal overload protection	Unit
E005	Antifreeze alarm	Unit
E006	Flow switch alarm	Unit
E009	High compressor's discharge temperature	Unit
E016	Usage pump 1 thermal overload protection	Pump 1
E018	High temperature alarm in cooling operation	Unit
E026	Usage pump 2 thermal overload protection	Pump
E040	Compressor termic	Compressor
E042	Poor heat exchange alarm	Unit/Sanitary
E611	Inlet water temp. sensor error	Unit
E621	Outlet water temp. sensor error	Unit
E631	Compressor intake temperature sensor	Unit
E641	Compressor discharge temperature sensor	Unit
E651	Outdoor air temp. sensor for climatic regulation	Unit
⁽¹⁾ E652	Desuperheater gas temperature sensor (if present)	Unit
⁽¹⁾ E662	Total recovery temperature (if present)	--
⁽¹⁾ E672	Sanitary temperature sensor (if present)	--
⁽¹⁾ E682	Plant water plant temperature remote sensor (if present)	
E691	Low pressure transducer	Unit
E701	High pressure transducer	Unit

⁽¹⁾ Only if the optional "GI" module is present and active function.

20 MODBUS VARIABLES

The control introduces default the next configuration:

BAUD RATE	9600
PARITY	EVEN
DATA BIT	8
STOP BIT	1
DEVICE ID	1

The control introduces default the next configuration

To configure the Modbus communication depending on your needs, it is necessary to modify the next registers:

H124 : BAUD RATE	
0	4800
1	9600
2	19200
3	38400

H125 : PARITY, STOP BIT	
0	NONE, 2 bit
1	ODD, 1 bit
2	EVEN, 1 bit
3	NONE, 1 bit

H126 : DEVICE ID	1 ÷ 200
------------------	---------

Modbus comands:

READING	HOLDING REGISTER
WRITING	6-16

Register	Format	Bit	R/W	Range	Name	Description	Note
1	INT	-	R	-	Data version	Firmware version	
2	INT	-	R	-		Firmware release	
3	BYTE (H)	-	R	-		Firmware sub-release	
	BYTE (L)	-	R	-		Firmware creation day	
4	BYTE (H)	-	R	-		Firmware creation month	
	BYTE (L)	-	R	-		Firmware creation year	
80 ÷ 97	ASCII	-	R	-	Serial number	Registration number	
1089	INT	-	R/W	1 ÷ 200	Serial address	Modbus serial ID	
200	INT	-	R	-	Machine setting	(0) Stand by	Reading values of the machine status
		-	R	-		(1) Cooling	
		-	R	-		(2) Heating	
		-	R	-		(4) Only sanitary mode ¹	
		-	R	-		(5) Cooling + Sanitary ¹	
		-	R	-		(6) Heating + Sanitary ¹	
7201	BIT MASK	0	R/W	-	Machine setting	Enablement of writing the machine status remotely	Necessary for the operation of the reg. 7200.
7200	INT	-	W	-	Machine setting	(0) Stand by	The writing values that are not allowed at this address can lead to unexpected operations, so keep only those values that are allowed in writing.
		-	W	-		(1) Cooling	
		-	W	-		(2) Heating	
		-	W	-		(4) Only sanitary ¹	
		-	W	-		(5) Cooling + Sanitary ¹	
		-	W	-		(6) Heating + Sanitary ¹	
7201	BIT MASK	1	R/W	-	Machine setting	Enablement of writing the setpoint remotely	Necessary for the operation of the reg. 7203/7208.
7203	°C/10	-	R/W	5.0 ÷ 23.0	Setpoint	Cooling	
7204	°C/10	-	R/W	25.0 ÷ 55.0		Heating	
7205	°C/10	-	R/W	25.0 ÷ 55.0		Sanitary	
7206	°C/10	-	R/W	5.0 ÷ 23.0		Second cooling	
7207	°C/10	-	R/W	25.0 ÷ 55.0		Second heating	
7208	°C/10	-	R/W	0.0 ÷ 80.0		DHW preparer	
7201	BIT MASK	2	R/W	-		Second setpoint	Enabling the switching to the second setpoint
7202	BIT MASK	0	W	-	0=primary setpoints, 1=secondary setpoint		Writing value
7217	BIT MASK	0	R	-	0=primary setpoints, 1=secondary setpoint		Reading value
7201	BIT MASK	3	R/W	-	Room temperature call	Enablement of remote room call writing	Necessary for the operation of bit 1 of reg. 7202.
7202	BIT MASK	1	R/W	-		Forced room temperature call remotely	
7201	BIT MASK	4	R/W	-	Sanitary call	Enablement of remote sanitary call writing	Necessary for the operation of bit 2 of reg. 7202.
7202	BIT MASK	2	R/W	-		Forced remote sanitary mode call	
7201	BIT MASK	5	R/W	-	Anti-Legionella ²	Enablement of anti-legionella cycle remotely	Necessary for the operation of bit 3 of reg. 7202.
7202	BIT MASK	3	R/W	-		Remote anti-legionella cycle request activation	The bit must be 1 for the entire cycle period.
7216	BIT MASK	5	R	-		Anti-legionella cycle in progress	
		6				Anti-legionella cycle failed or stopped	It remains at 1 until the next cycle, or it resets itself when the board is turned off.
7202	BIT MASK	5	R/W	-	Plant air-vent	Forced pant air-vent	Only if the machine is in Stand By (0).

7202	BIT MASK	6	R/W	-	Sanitary disabling	Sanitary call prohibition (without exiting from the actual mode + SAN function)	Active only if the setting of bit 3 is 7201 (when the room temp. call is also managed remotely).					
7202	BIT MASK	7	R/W	-	Defrosting	Forced defrosting	Only if the machine is in heating (2-6).					
7214	BIT MASK	13 14	R	-		Defrosting on call Defrosting in progress						
305	Hour	-	R	-	Operating hours	Compressor 1						
307	Hour	-	R	-		Compressor 2						
309	Hour	-	R	-		Compressor 3						
313	Hour	-	R	-		Compressor 1 circuit 2						
315	Hour	-	R	-		Compressor 2 circuit 2						
317	Hour	-	R	-		Compressor 3 circuit 2						
253	°C/10	-	R	-	Temperature transducer	Evaporation						
254	°C/10	-	R	-		Condensazione						
626	°C/10	-	R	-		Evaporazione circuit 2						
627	°C/10	-	R	-		Condensation circuit 2						
400	°C/10	-	R	-	Temperature ³	Water inlet						
401	°C/10	-	R	-		Water outlet						
405	°C/10	-	R	-		DHW						
422	°C/10	-	R	-		Compressors inhalation						
428	°C/10	-	R	-		Outdoor						
433	°C/10	-	R	-		Exhaust of compressor 1						
434	°C/10	-	R	-		Exhaust of compressor 2						
435	°C/10	-	R	-		Exhaust of compressor 3						
437	°C/10	-	R	-		Solar collector						
438	°C/10	-	R	-		Solar accumulation						
440	°C/10	-	R	-		Plant remote						
443	°C/10	-	R	-		Mandata miscelatrice pannelli radianti						
447	°C/10	-	R	-		DHW preparer recirculation						
20422	°C/10	-	R	-		Compressors inhalation (circuit 2)						
20433	°C/10	-	R	-		Compressor 1 discharge (circuit 2)						
20434	°C/10	-	R	-		Compressor 2 discharge (circuit 2)						
20435	°C/10	-	R	-		Compressor 3 discharge (circuit 2)						
406	bar/100	-	R	-		Pressions ³	High pressure					
414	bar/100	-	R	-			Low pressure					
20406	bar/100	-	R	-			Circuit 2 high pressure					
20414	bar/100	-	R	-	Circuit 2 low pressure							
7000	%/10	-	R	-	Analog outputs	Condensation fan						
7001	%/10	-	R	-		Circulating pump						
627	%/10	-	R	-		Condensation fan of circuit 2						
950	BIT MASK	0	R	-	Alarms ^{4 5}	High pressure	E001					
		1				Low pressure	E002					
		2				Compressor thermal protection	E003					
		3				Fan thermal protection	E004					
		4				Frost	E005					
		5				Lack of flow	E006					
		6				DHW preparer low temperature	E007					
		7				Lack of lubrication	E008					
		8				High discharge temperature of Cp1	E009					
		9				Solar collector at high temperature	E010					
		12				Compressor 2 thermal protection	E013					
		13				Fan 2 thermal protection	E014					
		15				Pump thermal protection	E016					
		951				BIT MASK	1	R	-	Alarms ^{4 5}	High temperature	E018
							2				High discharge temperature of Cp2	E019
3	Inverted pressure transducers		E020									
6	Compressor 3 thermal protection		E023									
7	Fan 3 thermal protection		E024									
9	Pump 2 thermal protection		E026									
11	Temperature incongruenti		E041									
12	Poor heat exchange DHW		E042									
13	DHW accumulation tank in high temperature		E050									
14	I/O module 1 disconnected		E101									
15	I/O module 2 disconnected		E102									
952	BIT MASK		0	R	-		Alarms ^{4 5}				Probe 1 error	E611
		1	Probe 2 error			E621						
		2	Probe 3 error			E631						

		3				Probe 4 error	E641
		4				Probe 5 error	E651
		5				Probe 6 error	E661
		6				Probe 7 error	E671
		7				Probe 8 error	E681
		8				Probe 9 error	E691
		9				Probe 10 error	E701
		10				Probe 11 error	E711
		11				Module 1 probe 1 error	E612
		12				Module 1 probe 2 error	E622
		13				Module 1 probe 3 error	E632
		14				Module 1 probe 4 error	E642
		15				Module 1 probe 5 error	E652
953	BIT MASK	0	R	-	Alarms ^{4 5}	Module 1 probe 6 error	E662
		1				Module 1 probe 7 error	E672
		2				Module 1 probe 8 error	E682
		3				Module 1 probe 9 error	E692
		4				Module 1 probe 10 error	E702
		5				Module 1 probe 11 error	E712
		6				Module 2 probe 1 error	E613
		7				Module 2 probe 2 error	E623
		8				Module 2 probe 3 error	E633
		9				Module 2 probe 4 error	E643
		10				Module 2 probe 5 error	E653
		11				Module 2 probe 6 error	E663
		12				Module 2 probe 7 error	E673
		13				Module 2 probe 8 error	E683
		14				Module 2 probe 9 error	E693
15	Module 2 probe 10 error	E703					
954	BIT MASK	0	R	-	Alarms ^{4 5}	Module 2 probe 11 error	E713
		1				Link inverter 1	E801
		2				Link inverter 2	E802
		3				Link inverter 3	E803
		4				Hardware fault inverter 1	E851
		5				Hardware fault inverter 2	E852
		6				Hardware fault inverter 3	E853
		7				Overcurrent inverter 1	E861
		8				Overcurrent inverter 2	E862
		9				Overcurrent inverter 3	E863
		10				High temperature inverter 1	E871
		11				High temperature inverter 2	E872
		12				High temperature inverter 3	E873
		13				Bad voltage inverter 1	E881
		14				Bad voltage inverter 2	E882
15	Bad voltage inverter 3	E883					
955	BIT MASK	0	R	-	Alarms ^{4 5}	Phase sequence inverter 1	E891
		1				Phase sequence inverter 2	E892
		2				Phase sequence inverter 3	E893
		3				Model error inverter 1	E901
		4				Model error inverter 2	E902
		5				Model error inverter 3	E903
		6				Overload error inverter 1	E911
		7				Overload error inverter 2	E912
		8				Overload error inverter 3	E913
		9				Overcurrent PFC inverter 1	E921
		10				Overcurrent PFC inverter 2	E922
		11				Overcurrent PFC inverter 3	E923
		12				Internal communication error inverter 1	E931
		13				Internal communication error inverter 2	E932
		14				Internal communication error inverter 3	E933
15	Fault PFC inverter 1	E941					
956	BIT MASK	0	R	-	Alarms ^{4 5}	Fault PFC inverter 2	E942
		1				Fault PFC inverter 3	E943
		2				Probe error inverter 1	E951
		3				Probe error inverter 2	E952
		4				Probe error inverter 3	E953
		5				Abnormal condition inverter 1	E961
		6				Abnormal condition inverter 2	E962

		7				Abnormal condition inverter 3	E963
		8				Inverter 1 EEPROM error	E971
		9				Inverter 2 EEPROM error	E972
		10				Inverter 3 EEPROM error	E973
		11				High discharge temperature of Cp3	E029
		12				Anti-legionella performed correctly	E060
		13				Anti-legionella failed or stopped	E061

¹⁾ if enabled

²⁾ the cycle is activated only if the DHW (4-5-6) status is terminated by the machine.

³⁾ if the read value is equal to 32766 the probe is not configured, if 32767 the probe is faulty

⁴⁾ reset alarms, write the value 0 with the command 6 on any of the registers of the alarms area

⁵⁾ the alarms of circuit 2 are mapped in the same way with an offset of 20000 (e.g. 20950)

06	09-2020	M.S.	A.B.	UPDATE OF DEFAULT PARAMETERS
05	05-2020	M.S.	A.B.	UPDATE OF THE PARAMETERS b05, b25, MODBUS TABEL
04	05-2019	M.S.	A.B.	
03	10-2018	M.S.	A.B.	ADDING MODBUS PARAMETERS TABLE
02	10-2017	A.B.	F.M.	UPGRADE ACCORDING TO V415R003S01
01	10-2016	A.B.	F.M.	UPGRADE ACCORDING TO VER234REV15RC3
00	08-2016	A.B.	F.M.	UPGRADE ACCORDING TO VER234REV13S4

Rev	Date	Author	Supervisor	Notes
Catalogo / Catalogue / Katalog / Catalogue			Serie / Series / Serie / Serie / Série	
MCO14110G7720-06			HWA1-A/H 0140 ÷ 0285	
			AIR/WATER CHILLERS AND HEAT PUMPS WITH AXIAL FANS	

Possible wasted electrical or electronic devices/products should not be located together with normal domestic waste, but disposed according to the current WEEE law in compliance with the European Directive 2012/19/UE and following modifications 2003/108/EC. Please inform yourself at your local Administration or at your reseller in case the product will be replaced with a similar one.

